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The Military Training Camps

By Major M. B. Stewart, Infantry

A FRIEND of mine came to Plattsburgh in the early part of summer, wandered around watching things for a time, then settled down in my tent to talk things over.

"Say, honestly, what do you fellows think of this business? What's the big idea?"

I did not tell him. To be honest, I did not know what to tell him. The whole idea was new to most of us. The work was going forward by leaps and bounds. We "fellows" were having our eyes opened wider with each succeeding day. Every man was in his shirt sleeves, figuratively as well as literally. We had no time for summing up. Results were piling up too fast for either tabulation or analysis.

Now, as I look back upon the experience, I have very much the same sort of a feeling. No matter how you may choose to look at it—and there are a number of points of view—the Plattsburgh idea, as it has come to be known, is a big one.

A great deal has been written about these camps. Some of it has been serious; some in humorous vein; all of it interesting, but to the military mind, more or less sketchy. The result is that the average military man is inclined to be skeptical, to look on the movement as a new kind of fad, valuable in a way because it serves to attract men who could not otherwise be interested in military matters, but nevertheless a fad that can lead to nothing practical in the way of real military training or preparedness.

For example: my friend pointed out a man walking down the company street.

"What are you going to do with him?" he asked. "He must be all of fifty years old."

He was fifty years old and then some more, and to answer my friend's question, it is necessary to go back a little into the history of the movement.

To begin with, the Training Camp Movement, in its present development, may well be classed among the "War Babies," for it had its birth as a result of the war now going on in Europe. As far back as 1913, camps had been established for the intensive training of college men. These camps were growing in strength each year, and the idea of using them for the purpose of training prospective reserve officers was gaining ground, but outside of an interested few, the movement had attained little prominence.

From the beginning of the war in

Europe, Americans began coming back home, awakened to a realization of what war really means. Some of them had had a taste of war's side issues, and the close-up view had served to disillusion them most thoroughly of our juvenile, American fictions with reference to war.

On the heels of their disillusionment followed the definite conviction that something should be done to prepare the country for the business of defense just as we prepare for any other business. With the traditions upon which we have been fed in this country, it was only natural that their first idea should be along the line of personal preparedness. Up to this time, the average American's mind had never gone beyond the shoulder-the-musket phase of preparedness. As a preliminary, our advocates determined to learn the fighting man's game for themselves.

They took their problem to General Wood.

"You are providing camps for intensive training of college men," they told him in effect. "Why not provide something of the sort for us?"

The answer was the first Business Men's Training Camp. The movement grew. The idea expanded, taking on a new aspect as it developed. This broader aspect was voiced by one member of that first camp when he said:

"I am here as a silent protest against our unpreparedness."

Whatever may have been the idea of the attendants when they went to camp, that was their idea when they came away, and that brings us at once to the explanation of the fifty-year-old recruit, and to one important aspect of the movement; namely, its educational influence.

Succinctly, this movement has started Americans to thinking in military terms and has educated them to think along ever broadening lines. As I have said, the idea in the minds of the originators of the movement was elementary—advanced for Americans, I grant you, nevertheless elementary. It had to do with the matter of personal preparedness, the making of fighting men, but the development of the idea led straight to the broader conception of real national preparedness.

In other words, men went to Plattsburgh with the idea of getting experience and training first-hand and of setting an example to others to do the same. They came away from Plattsburgh awakened to the fact that personal preparedness is only the first step. They had learned the meaning of discipline, training, teamwork, and organization in the scheme of military preparedness. On the heels of this, they began to grasp the true inwardness of national preparedness and to realize that it is not a matter of days or months, but of years, for a nation to put its house in readiness for defense; not a matter of fighting men, rifles, and equipment, but of an organization which reaches out into every essential phase of national life.

Industrial organization took on a military significance in their minds. The difference between resources — men, money, and raw materials—and organized preparedness to make use of these resources in time of war became apparent to them. In a word, they came away from Plattsburgh trained to some extent in the fundamentals of the fighting man's business and educated to a greater extent in the military obligations and responsibilities of citizenship. Whatever else they may have gained from the experience, they were in a po-

sition to consider the military needs of the Country in a broad, intelligent way.

To have some thousands of men learn such a lesson—or teach it to themselves, if you prefer—is of itself worth while, but that is not all these camps have done. They make missionaries. It is characteristic of the Plattsburgher that he is not content to know a thing himself. He passes it along to his friends. He is determined that every American shall have no excuse for not knowing what he knows. In other words, each one of them goes home a self-constituted apostle of the Doctrine of National Preparedness.

What such a movement means to this Country, the military man who has labored for years under the open indictment of being hopelessly, if harmlessly, insane, is best qualified to judge. No one else knows so well the difficulty of combating the selfish American doctrine of individualism and of awakening anything like a spirit of nationalism.

That is the answer to the fifty-year-old recruit. Nobody could reasonably expect him to shoulder a rifle in the defense of the Country. It would probably be a criminal waste of good material to let him do so. He is probably too valuable in other ways. He can do better service in defense by living and serving than by serving and dying. On the other hand, nobody can deny the value of such a man, thinking along lines of rational military policy, armed with first-hand information and carrying in his message the weight of mature judgment and experience.

In men such as those to be found in these camps lies the only hope of this Country for the future. Any worthwhile preparedness must begin in the minds of the people. It must be supported by the profound conviction of the people. Until thinking men, in sufficient numbers to dominate the collective thought of the people, and to direct military legislation, have been awakened to an active interest in the welfare of the Country, our efforts for preparedness will amount to little more than a useless waste of time, energy, and money.

There is one other all-important side to the Plattsburgh education.

The matter of national defense is not one for individuals, or classes of individuals, to determine. It must spring from the effort of a united people, inspired by a common interest and drawn together on terms of equal responsibility. National defense is a game of life and death in which dollar aristocracy and cheap class distinctions have no weight.

We have always posed as a democratic people. It is possible that there may have been a time when we practiced what we have preached, but that time is not within the memory of the present generation. Men came to Plattsburgh from practically every walk of life, strangers to each other as much as though they spoke different languages. Figuratively, it was a babel of class.

When they stripped off their civilian clothing, they laid aside class distinction. When they put on their uniforms, they plunged into a common level of olive-drab mediocrity. It was then that new values in manhood began to develop. It was a new game to them, one in which all had an even start and no favor, and the intimate, shoulder-to-shoulder, sweating grind of military routine taught them the lesson of personal worth. The man who rose above the common level did so because he

could "deliver the goods," because to some extent he had shown qualities of leadership. It mattered not who he was in the world outside of Plattsburgh, if he could lead a squad or a platoon and do it well, his comrades recognized his ability and took off their hats to him for the man that he was.

Out of that welter of grime and toil, the shade of Democracy was resurrected and began to take on the form which made it attractive to men in the days when they took each other at their face value.

The lesson of democracy was learned. More to the point, it will not be forgotten. Those who learned it do not want to forget it. They take it home, cherish it, and introduce it into their scheme of life as a new and invigorating factor.

We come now to what may be called the practical aspect of these camps.

Most military men are willing to acknowledge the educational value of these camps, but they are likely to balk at the idea that they are productive of any military training of practical worth. They are inclined to discount the idea that anything worth while from a military standpoint can be accomplished in thirty days. It sounds unreasonable, I admit, until you begin to reckon in hours and to take into account the factors of system, method, and earnestness.

One month seems small. Thirty days does not sound impressive, but 200 hours is a very good total for the actual military training that the average regular soldier receives in any period of three months. This is not argument. Count it up for yourself—three hours a day, five days a week, twenty days a month, sixty hours, three and one-third months.

Now introduce the factor of a system which takes minutes into account, and of a method which makes each one of them count, and the practical training value of the month in Plattsburgh takes on a very respectable character. On top of this, add the fact that the attendants enter the game with every ounce of intelligence, energy and enthusiasm they possess, that they play the game all day long, talk it half the night, revel in the military atmosphere, forget everything else but the reek of military routine, and the sum total mounts still higher.

As a matter of detail, let us look at the physical training. The men who go to Plattsburgh are about the physical average that you will meet in a stroll down any city street. They make no special preparation for the work. Ninety-five percent of them jump straight from an office, a shop or a club into a uniform and a schedule of work that begins at 6 A.M., ends at 10.30 P.M. and includes at least eight hours of steady physical grind in between. Without considering the individual cases of men who lose from ten to thirty pounds and a quarter as many inches of girth without loss of strength, let us take the general run.

The maneuver period—the "hike"—which brings each camp to an end furnishes an opportunity to judge of the general physical condition of the command after three weeks' training. The period at the end of the August camp was a fair average of maneuver conditions, temperature, length of marches, character of work, etc. The temperature ranged from normal summer heat to brisk fall weather with drizzling rain.

The marches averaged about nine miles from camp to camp. The daily maneuver added two or three miles more to that distance. The roads were about the average—part macadam, part dirt.

One regiment went through that march with an average of about three men per day in the ambulance and generally at least one of these men was a case of sprain.

On the march at the end of the July camp, made over unusually dusty and sandy roads, in extremely hot weather, over about the same distances as in the August "hike," one of the junior regiments came through with a record of six companies which had not lost a single man during the entire "hike." In the senior regiments, the record was not as high. Appreciable percentages fell out on one or two of the hottest days, but comparatively few of them rode into camp. After resting, the majority walked into camp in full equipment.

From a military standpoint, these records are nothing remarkable, but when we consider the material and the time it was under training, they are worthy of thought.

In target practice, the results speak for themselves. With a maximum of three or four afternoons of preliminary work and gallery practice, one regiment went on the range, fired the Qualification Course for Organized Militia, without instruction practice, and came away with a record of over sixty percent marksmen or better. Without referring to the actual records, it is safe to say that fifty percent of all men attending camp during the past summer did equally as well, and among them were large numbers who had never fired a service rifle in their lives.

It was in the field work that results were the most unexpected. It seems absurd to think of preparing men in three weeks for anything like efficient field service. The mind of the average military man refuses to grasp such a possibility. Field work is the last word in military training. It calls for the best of all that goes into the training of the fighting man—physique, discipline of the march, camp and firing line, personal hygiene, and camp sanitation.

The mere thought of field service after three weeks of training conjures a vision of unwieldy mobs, led about by hand, nursed, valetted, and personally conducted. To many of the officers who were on duty at the camp during the past summer, the idea of attempting such a performance with six or seven thousand men brought a sinking of the heart. However, that feeling disappeared with the first day of the march.

During the July encampment, four regiments, numbering over 6000 men, were put through the mill which ended with a seven-day period of marching and maneuvering. Camp was made and broken each day. A maneuver problem, including the use of the three mobile arms, was solved.

Due to lack of transportation, it was necessary to break camp and load at an early hour. One hour after reveille usually found camp down and the transportation ready to move.

Thirty minutes was a fair average for the time required to make camp. The lack of confusion in both making and breaking camp was most noticeable. After the first day, regiments marched to their camp sites, battalions formed, and companies pitched camp without an unnecessary movement and almost without command. It must be remembered

that this was done with men who had never pitched a shelter tent more than once or twice in their lives and had never seen a regimental shelter-tent camp before.

In the maneuvers, control, from the highest to the smallest unit, was never for a moment lost. There was no such thing as straggling men or units, no rushing here and there, no confusion. Proper formations were used. Movements were regulated by orders. In other words, there was a total absence of the go-as-you-please kind of maneuver work. Problems were solved with the idea of presenting a picture, or series of pictures, of proper tactical employment, and movement was so controlled that these pictures were never askew. Instructional value, from the senior officer down to the last private, was sought and attained.

Of course, much of the control was due to the regular officers in command of the various units, but it should be remembered that these regiments averaged not more than sixteen regular officers and no noncommissioned officers. The rest, officers and noncommissioned officers, were attendants, and much of the control was necessarily in their hands. Without a fair degree of training and an intelligent conception of what they were doing, control on the part of these men would have been out of the question.

I realize that what I have written does not convey a very vivid picture of the work at Plattsburgh. It does not even give a convincing conception of the results accomplished. Nothing short of first-hand observation can do that.

It is a new experiment, new to our traditions of military training, almost beyond the conception of those who have had no opportunity to observe it.

The officers who went to Plattsburgh for the first time during the past summer did so with mental reservations as to what the work amounted to. Most of us were somewhat staggered by the schedule with which we were presented. It required cold facts and actual results to convince us. The more we saw of both, the more our reservations vanished. Our greatest trouble was to keep from surrendering to the high-pressure atmosphere, to keep our viewpoint unchanged and our perspective normal.

In the end, we came away with an experience of the greatest professional value to us, and a gospel of work which was new to most of us.

Advice to the Infantry Soldier *

By Captain André Laffargue, 153d Infantry (French)

PRECEPTS AND DUTIES OF THE INFANTRYMAN

Precepts of the Infantryman.

The Infantryman is the Workman of Victory.

DISPOSITIONS made, the troops in rank, and everything ready, the general throws his infantrymen into the fight. From then on, amid the shells and bullets, they will scarcely hear the commands, they will scarcely see the reinforcements, they will be alone, but everyone counts on them; they are the workmen of victory.

Each One, Even the Most Humble, is Responsible Before the Country.

In these decisive hours, he who is the hope of the country often does not realize it. The battle is limited to the vicinity of his shelter; he reckons himself of small account, supposes his effort to be almost useless, and sometimes says to himself: "What is the use of exposing myself more for so small a result?" As few officers remain and they are scattered here and there along the line, no one comes to shake up and lead on the rifleman; he excuses himself by saying that he is doing like the others, and thus it is that the battle remains stationary because the small unit does not budge.

When the rifleman is alone, when the chiefs do not see him, the Country sees him; if he advances or falls, it blesses him.

In the Combat, Fight.

On the field of battle, there are in the first place the real fighters, those who inflict losses on the enemy. But there are also the frightened ones who lose their heads and only think of crouching in a hole. The latter are there solely to form useless corpses. Whatever one may do, one's life is exposed; let it at least have served some purpose and have been paid for in advance!

Live and Conquer!

The question is not to get killed bravely and to disappear; one must live and conquer. In order to preserve his life, the coward tries not to expose it; brave men reckon on their courage to defend it.

The temptation of the cowards is strong; it is more agreeable to remain in one's hole than to advance amid the bullets; but the coward has no coolness, and he loses his head; that is why, if he succeeds in escaping once or twice, one day he makes the wrong movement which in war is paid for with one's life.

The brave man is shrewd; he dares to look danger in the face; he knows when one should despise it in order to advance and when it would be foolhardy to defy it. He does not fear the enemy, because the enemy is a man whom one can always dispose of by audacity and cunning. A good rifle, quick legs, a clear eye, and a cool head—that is the secret for advancing through bullets and killing the enemy.

Good Men Make Good Soldiers.

He who is not a good soldier is not an honest man. To follow one's chiefs into danger one must respect and love them; the scoundrel has neither faith nor law; he respects nothing and loves only himself. When the chief is not there, when the soldier finds himself

* *Conseils aux Fantassins*, Paris: Plon-Nourrit et Cie. Translated for the Infantry Journal by an officer of Infantry.

alone, that which guides him on the path of duty in spite of his anguish and his terror, is his conscience. Conscience belongs only to the honest man.

Complete Victory.

Many Frenchmen have already fallen who have given their lives for victory. Have we the right henceforth to declare ourselves tired and to stop? No, for we cannot profit by the sacrifice of our comrades without finishing the work for which they died. No peace without complete victory, even if we lose all our limbs in obtaining it. Germany wanted war; we must extract her claws for a long time; we shall be blessed for doing so.

THE DUTIES OF THE SOLDIER.

To Follow his Chief.

The chief is the rallying sign; he need not watch his command for it ought to follow him blindly. If he falls, it continues without him and avenges him.

An officer's body is never abandoned to the enemy; the company brings it back or goes back for it.

To Avenge the Dead.

When the soldier recalls past battles, he again sees his comrades sleeping on every spot of ground where the regiment has fought. They have fallen, others have replaced them in the company. They, so strong and brave, can do no more. But their memory is not forgotten, and their sacrifice is not in vain. They are always in the hearts of those who remain, and at this thought, every man feels a dull anger which renders his arm more firm and his eye more keen. In the trench or in the fight, there should be no rest until the enemy has dearly paid for the fallen comrade. The dead cry for revenge. No rifle is more accurate than that of a dead man.

To Give Burial to the Dead, to Succor the Wounded.

An honorable burial should be given to fallen comrades. One should be considerate enough, in spite of fatigue and the oppression of danger, to bury them otherwise than by placing them in any sort of a hole with a little earth thrown over the body.

The wounded must be bandaged, put under shelter if impossible to leave one's post, and when the situation permits it, transported to the rear, even if one is ready to drop from fatigue and lack of sleep.

To Inflict Losses on the Germans.

This is the idea that should always be uppermost in the soldier's heart. It gives him that silent ferocity which is the mark of true ardor; if he is on the point of yielding, it supports him. When he is suffering and his courage is deserting him, he should put a cartridge in his rifle and take accurate aim.

Conduct Towards Prisoners.

The enemy who surrenders should be spared, while keeping well on guard against the treachery habitual to the Germans. To massacre for the pleasure of killing is cowardly and barbarous and dishonors an organization. But in the fray, as long as resistance lasts and the enemy is capable of recovery, no quarter should be given, as kindness is often dearly paid for. The wounded enemy is a poor wretch who should be aided, and one must no longer see the hated uniform.

To Remember Always That One is a Frenchman.

In one word, if the infantryman asks himself how he should act, let him always remember that he is a French soldier.

WHEN IS ONE AFRAID OR A COWARD?

Faint-heartedness is on the look-out for the soldier at every step on the field of battle; he should know it well, in order to be able to resist it and to lead back on to the right road the comrade who is giving way to the temptations of fear.

A soldier is not timorous or cowardly because he is afraid or perturbed; *he should not, therefore, grow discouraged or lose confidence in himself.*

Danger always makes a strong impression; it is difficult to become accustomed to the bullets and the shells, for this is too contrary to human nature. But in proportion as the soldier becomes inured to war, although he recognizes danger more quickly, he loses his head less readily, as he knows when to fear it and when he can sleep in peace.

Sometimes he is ill-disposed; his body is suffering, and his mind is ill. He is for instance under the impression of bombardments or of violent combats; he is motionless in mud through rain and cold; the hours pass slowly, the war is long, and he thinks of the unknown morrow. Bad ideas then arrive; it is the spirit of dejection. He who suffers from this is not a coward; he becomes one if he abandons himself to it, if he continually whines about his miseries and then tries to find a means of quitting his post. He is a brave man if he says to himself: "I'm not worth much these last few days, but all that will pass; I'll wait, work, or sleep."

The Timorous Man.

The timorous man is the soldier who is afraid of trifles. He fires into the air or over the parapet without showing his head. He trembles, believes himself lost and falls back as soon as he sees an enemy coming in his direction; he cannot stand the sight of an adversary, because he always believes he is stronger and braver than he is himself. When he is acting as sentinel, he sees and hears Germans everywhere. When he is on patrol or sentry post (and it is then that he is at his "best"), he imagines continually that a German is going to jump on him; if he hears a noise, he retreats at full speed, out of breath, shouting that the enemy is advancing, frightening everyone; in all probability, it is a cow wandering about or a wounded man groaning and dragging himself toward our lines.

The Coward.

The coward is a man who abandons his post on any pretext whatever. He accompanies the wounded without orders, not to render them service, but to withdraw to the rear and to remain there. If he has a slight wound or a scratch, he is well pleased to profit by it and to retire, leaving his comrades to bear the brunt of the danger; ***it is absolutely forbidden to quit one's post in combat without authorization.***

He dares not throw a grenade or fire a shot for fear of the reply.

Fugitives are cowards as well as those who surrender without having used up all their cartridges or having done all in their power to escape the enemy.

Scoundrels.

These are the few individuals who have the fixed intention of not doing their duty or of committing a bad action.

Soldiers who slink away; they hide themselves when the chief does not see them and only reappear some days later, when the battle is over, saying they have been lost. In former wars, when they returned in the evening in time for supper, the squad passed sentence on

them and beat them till the blood came.

Scoundrels do not want to expose themselves; they probably think they will afterwards live happy and tranquil while brave men will have bought peace with the price of their blood. This trickery is not tolerated; *everyone must march.*

When is One a Brave Man?

Most soldiers are brave, many do not even know it.

THE COMBAT IN THE TRENCHES.

The infantryman in the trench is not very fond of work; he often prefers to crouch in the mud under a poor shelter rather than to disturb himself even for a moment. In this way, when he is bombarded, he does not know where to hide himself.

Moreover, the infantryman considers that he is in the trench for the sole purpose of preventing the enemy's passing if he should attack. As the enemy does not attack every day, the habit of fighting is lost, the adversary is allowed to fix his wire entanglement in peace and to dig his shelters; thus when the time comes to leave the trench and to attack, complete defenses are encountered that have to be taken by main force.

The enemy who is not killed in advance will perhaps kill you the day of the attack.

What the Infantryman in the Trench Ought to Do.

1. Preserve himself.
2. Inure himself to war and train himself.
3. Destroy Germans.

TO PRESERVE HIMSELF.

It is absolutely stupid to get killed or wounded in the trench through negligence, *because one has served no purpose.* A soldier can never be replaced. Therefore, he should build a good shelter where he can laugh at the bombardment and sleep in peace. He should not commit the indiscretions that everyone knows of. He should watch over careless comrades, and particularly young soldiers or newcomers who want to see everything and are ignorant of trench habits.

TO INURE HIMSELF TO WAR.

In the trenches, the soldier adopts habits which are bad for fighting. He remains continually in shelter; when he moves about, it is almost always in the communicating trenches, so that it is very disagreeable to have to pass uncovered across spaces where the bullets are whistling. One should harden one's self so as not to be impressed by every bullet the day of attack; to do this, patrolling at night should be practiced and wire planted in front of the first line.

The infantryman should profit by his stay in the trenches to acquire *skill, which is his surest protection in combat.* Every day he fires a box of well-aimed cartridges at the hostile trench; he studies the aim of his gun for various distances; he also practices rapidly bringing up his rifle into position, thus preparing himself for firing during a hand-to-hand fight. Every soldier acquaints himself with the handling and the throwing of the different models of grenades; he should interest himself in everything pertaining to explosives, the way to prime bombs and trench projectiles.

HOW TO DESTROY GERMANS WITH ONE'S RIFLE

Months can be passed before the enemy's trench without seeing a German; it is therefore difficult to inflict

losses on them. However, with skill and patience, good results can be obtained.

One should begin by *observing* the enemy's trench and knowing exactly the points where the adversary can be caught should he appear for half a second.

Points Where the Enemy is to be Found.

The loop-holes.—All of them are not occupied. Those which are too visible are there merely to divert attention. Often the loop-holes for firing are on a level with the ground; in that case, they are very narrow, being just the width of the rifle, and are hidden by turf or a clump of grass.

In order to discover the loop-holes which are really occupied, shots should be provoked by showing a cap above the parapet, while other soldiers to right and left observe.

The shelters.—There is always somebody around the shelters; they are the points where someone can always be surprised.

The shelters are revealed by an elevation of the parapet. As a rule, the enemy commits the blunder of loading his shelters with sand bags visible even from the outside of the trench. A lookout hole is often found close to the side of a shelter. Finally, escaping smoke is the best indication of the inhabited part.

Observation posts.—They are revealed by an accumulation of sand bags and by the periscopes which are regularly to be seen there. The periscopes do not project much above the parapet; they are often covered with grass or by a gunny sack, but the minute observation of every second permits their discreet appearance to be discovered. It is during the action of the enemy's artillery or his bomb-throwing that a fleeting movement in the observation posts can be observed.

Moments When the Enemy is Outside.

In the morning and on cold days, while the sun is bright, everyone is outside.

At meal time, if it is fine weather; this moment is often indicated by slackening of rifle fire.

When our trenches are being bombarded, there is a crowd of men at the loop-holes opposite, enjoying themselves.

At night the enemy leaves his trenches to construct works and to repair damage done to his defenses or his wire by our artillery.

The reliefs.—The moment of the relief can be recognized by the slackening of rifle fire, the sound of voices, the silhouettes which defile at night at certain points when the communicating trenches are impassable. It can always be seen when there has been a relief by the change in attitude and habits of the enemy. By repeating the observation one can recognize the days of relief.

To give rough treatment to the enemy arriving for the relief is the best way to intimidate him during the whole of his stay in the trenches.

Organization of the Watch.

1. To observe a point that has been located, one should watch through a *small observation loop-hole.* The observation loop-hole is merely a hole made by a stick in the parapet, or a tube placed in the interior of the parapet and directed towards the point under observation. A few tufts of earth are placed at the exit of the loop-hole so that it will not be too regular. One should avoid looking continually through wooden loop-holes or steel

shields, which are often points marked by the enemy.

2. To watch a part of the trench, observe through a loop-hole placed slant-wise in the parapet or by means of a periscope. To obtain a view over the whole of the enemy's trenches, use also a piece of mirror fixed at the end of a stick planted on the rear wall of the trench.

Observation through field glasses (field glasses of the chiefs of section).—The enemy's trench usually appears completely deserted; but on observing it through field glasses, one is astonished by the details revealed. One perceives quite near, from time to time, the eye of the enemy observer who shows himself at his loop-hole, or the almost imperceptible smoke of a cigarette.

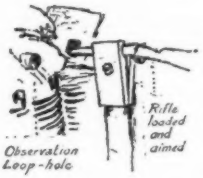
Field glasses may be used to observe a point which has been located; they allow no movement of the enemy to pass unseen, and the firing becomes instantaneous and implacable. To watch through an observation loop-hole, one should look through only one barrel of the field glasses.

Organization of the Firing.

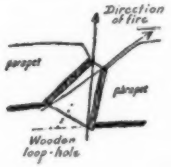
It is necessary to be able to fire without danger at a located point and on the parts of the enemy's trench outside the located points.

1. *To fire instantly at a located point* (loop-hole, observation post . . .), a loaded rifle should be continually aimed at it. It is therefore necessary to construct an aiming rack (*chevalet*), which can resist the recoil without losing the point of aim. A rudimentary rack (a sort of vice) can be built with the means found on the spot in the immediate neighborhood of the trenches. It is sufficient to have two planks forming jaws, a hinge to unite them, a stake to which the end of one of the two planks is firmly nailed and a strong tightening screw. A piece of cloth should be placed between the jaws and the rifle. Little wedges of wood may be used so as to enable aim to be taken more to the right or left.

An observation loop-hole is made at the side of the aiming rack; when the observer sees a shadow pass in the opening of the shield opposite which he is watching, a touch of the finger on the trigger is all that is required, and the bullet goes straight and instantaneously to its mark.



Armor-piercing bullets should be used against the enemy's shields so as to make sure that if the bullet does not pass through the opening, it will hit the adversary by piercing the shield.



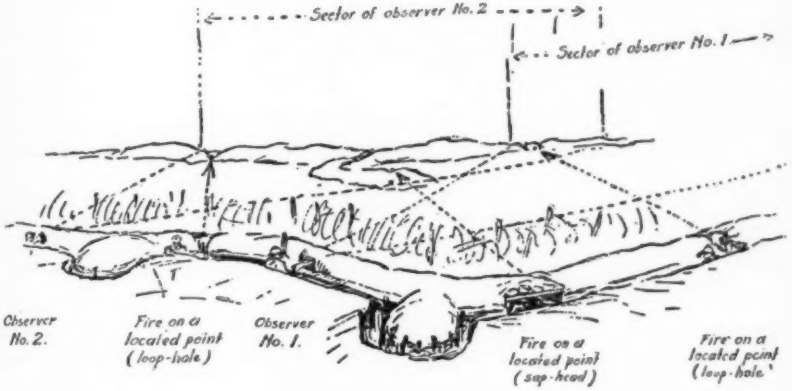
2. *To aim at an enemy who may show himself outside the located points,* place wooden loop-holes slant-wise in the par-

apet so as to be protected against shots from the front (the most frequent). Shooting through these loop-holes is done without aiming racks.

The observer placed at these loop-holes is chosen from among the best shots. He watches a section of the German trenches. If he sees an enemy suddenly show his head, he places the gun to his shoulder and fires.

Many tricks can be imagined, among others, the burning "de la guitoune" that is done towards nightfall. Straw is lighted amidst much shouting and shaking of dummy figures; the enemy does not fail to rush to the loop-holes to enjoy the sight and make fun of the adversary. When it may be supposed that the loop-holes are occupied, they are fired into.

ORGANIZATION OF THE FIRE OF OBSERVERS IN THE COMBAT TRENCH


Sector of observer No. 2
Sector of observer No. 1
Observer No. 2.
Fire on a located point (loop-hole)
Observer No. 1.
Fire on a located point (sap-head)
Fire on a located point (loop-hole)

How to Make the Enemy Appear.

In order to be able to fire at the enemy, he must be forced to show himself while riflemen placed at the loop-holes stand ready to fire. Several ways of accomplishing this may be contrived:

Simulate an attack by opening a sudden fusillade, throwing grenades, and shouting; the enemy leaps to the loop-holes.

Show from time to time a cap in a loop-hole or on a level with the parapet; the enemy observer fires, but he immediately receives several shots in his loop-hole.

Throw up earth on the parapet or on the saps.

How to Use the Rifle Grenade in Order to Inflict Daily Losses on the Enemy.

It should be well understood that the use of rifle grenades is capable of causing more losses to the enemy than bombardment.

The rifle grenade arrives unexpectedly without any noise; it bursts before one has even had time to get out of the way. As it does not arrive at fixed hours like the bombardment, the adversary cannot continually avoid it by taking refuge in his shelters; when he is moving about, his mind must be continually on the alert. This perpetual menace

renders the enemy's sojourn in the trench extremely disagreeable.

Before grenades are thrown, the enemy's trench should be well observed, and the points where the adversary is to be found and where it is sometimes possible to reach him (shelters, observation posts, communicating trenches, trench junctions, latrines . . .) should be located. The officers indicate the direction and the approximate distance of the points that cannot be directly seen.

Rifles are placed in aiming racks opposite the most important points, and grenades are fired from time to time, both night and day. In this way, a sentinel may be taken by surprise, or a smoker in front of his shelter, a non-commissioned officer or a cook moving about in the trench.

Sometimes the enemy tries to reply; it is then necessary to redouble the fire with vigor and bombard the enemy without ceasing; as soon as he finds himself the weaker, he will only think of sheltering himself better.

Instead of executing an *individual slow and continuous fire,* it is preferable in certain cases (enemy reliefs, fatigue duty, working parties, assembly of the troops before an attack) to execute a sudden and violent surprise fire, with the greatest possible number of rifles. The firing is begun by a volley; it is then continued at will.

When the artillery has destroyed certain parts of the enemy's trenches and made breaches in the wire entanglement, the enemy takes advantage of the night to repair the damage; he can be considerably annoyed and losses be inflicted on him by showering grenades on the points damaged during the day.

ATTACK ON THE TRENCH.

In case of an attack, everyone goes quickly to his combat post. When the attack is preceded by a violent bombardment, this post sometimes no longer exists, the trench being merely a collection of knolls and holes. One shelters himself then as best he can; it is not necessary to have a solid trench in order to fight.

It sometimes happens that the enemy succeeds in invading the trench and in crossing beyond it before the defenders have left their shelters. One should not think that all is lost; a space is cleared around the shelters by means of grenades, and the enemy is fired at in the rear. It is by so acting that intrepid garrisons have annihilated entire German companies who had already passed the first trench.

PROTECTION AGAINST ASPHYXIATING GASES.

How We Can Foresee That There is Going to be a Gas Attack.

The attack takes place in calm weather with a slight wind. The enemy remains quiet in the sector for several days. There can be heard sometimes in the enemy's trench a sound of sheet iron being moved about. Preparations can be observed the whole length of the enemy's trench. Little balloons or smoke which rise at the rear of the enemy's lines to indicate the direction of the wind are sure indications. When the attack starts, a prolonged hissing can be heard; this is one of the indications by night.

Means of Protection.

Always keep the mask in a spot where it can be found immediately without looking for it. When an attack is foreseen, the goggles should be placed on the forehead and the mask around the neck so that it can be adjusted rapidly. Give the alarm as soon as the attack begins; adjust the spectacles first, then

the mask. Occupy the combat post and open fire in order to prevent the enemy from advancing and to break up the cloud. Carry out the general instructions which have been prescribed in advance by the noncommissioned officers. When the cloud is dispersed, do not take off the mask, as a new cloud may follow. Do not touch food which has been exposed to the cloud. Never wet the mask and do not take it out of its box without good reason.

THE COMBAT.

What does the infantryman do in combat?

It is always and everywhere the same thing:

After the artillery has demolished the defenses and terrified the defenders, *the infantryman rushes to the attack and cleans up the position.*

He pursues as far as possible in order to gain all the ground he can at one stroke.

He holds firm beneath the shells and against counter-attacks in order not to lose a foot of the ground he has taken.

Therefore—

Approach the enemy up to assaulting distance (between 100 and 200 meters);

Make the assault;

Pursue;

Hold firm.

If one is not already at assaulting distance, the enemy must be approached, whether by day or by night.

During the day, the advance is made under the protection of the artillery; the marching must be brisk, and there must be no lagging under the fire; the longer one remains in the rain, the wetter one becomes. Advantage should especially be taken of clear spells.

Thus, the marching is done in order, by rushes, in line and without firing, as far forward as possible.

But when the enemy's infantry fire becomes lively and accurate, as for instance at short distances, it is no longer possible to march exactly in line; one should run at the top speed and fire in order to kill the enemy in advance.

From this moment, there is scarcely any more order; the commands can no longer be heard in the midst of the din; the officers cannot always be seen.

It is then that the rifleman, instead of believing himself lost and remaining motionless, *arranges with his comrades to advance continually,* sometimes watching for his chance for a long time, running, digging, shooting, throwing grenades; this is the subject of the following pages.

Shelling.

Young soldiers are always very much impressed by the shells, especially by the big ones. Seasoned soldiers scarcely like them any better, because the din and the blast of violent explosions upset and disorder the brain.

But the seasoned soldier knows that the shell often makes more noise than it does harm and that after a terrific bombardment, everybody is by no means destroyed.

How to Protect One's Self from Shells.

The big shell, which is so appalling, is only really dangerous if it falls on the place where a man is standing, because all the splinters rise into the air.

The soldier should therefore lie down flat when the shell bursts. Even if he is quite close to it, he scarcely runs any risk.

He should not get up immediately after the explosion, especially if he is from 200 to 300 meters from the place

where it was burst, because the splinters do not fall until a long time after the explosion.

Against shrapnel, the helmet and the knapsack (with an interior mattress formed by the jacket or the folded blanket) are pretty effective protection against the splinters and balls.

HOW TO ESCAPE THE SHELLING.

During the Combat.

Advance rapidly to get beyond the shelled area. Some men, completely distracted, without the strength to advance, lie down with their face to the ground; they will be crushed where they lie.

Approach within a short distance of the enemy. In this way, the enemy's artillery ceases fire for fear of placing shells indiscriminately amongst its own men and ours.

Artillery fire, when it is violent, throws the ranks into *confusion and disorder.*

Each soldier has only ears for the roar of the approaching shell; he slows down and is strongly tempted to throw himself into shelters or under cover. Thus, the units split up, run pell-mell, or stop altogether. *Disorder means massacre.*

Therefore, march strictly in place and in line. Seize hold of the frightened ones and keep them in ranks.

In the Trench.

Dig shelter caves. Do not wait till the last moment, as often happens, through carelessness.

If it is not possible to dig deep shelters, the line of trenches should be advanced during the night to within a short distance of the enemy.

How to Use the Rifle.

The rifle is used to destroy the enemy from afar in order to be able to approach him without too much risk. As he advances, each soldier in this way *clears a space* in front of him; it is to his interest to make it complete.

In order to use the rifle effectively, it it necessary:

To take up a good position and make ready to fire;

To select an aiming point;

To watch the enemy;

To know the right moment for firing.

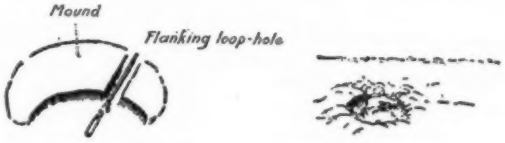
METHOD OF TAKING UP A POSITION.

(See examples for arranging a rifleman's post, pages 266–267.)

To fire well, one should be sheltered; a soldier who risks getting shot at any moment is nervous; he hurries, and his ill-placed bullets make the enemy laugh and make fun of him. The first consideration of the rifleman who is going to open fire should therefore be to construct or to arrange a position where he can lie on watch in safety and comfort. This position will consist of a heap of earth for protection from shots in front, and of a loop-hole. But this loop-hole, instead of being directed straight toward the enemy, is slanting; consequently, the soldier does not fire at first directly at the enemy in front of him, but at the adversaries more to the right. In this way, there is no risk of receiving a bullet in the face, which often happens when a new shelter is reached and the enemy is on the lookout. All the bullets which arrive from the front, strike the heap of earth without causing the slightest harm to the rifleman.

In addition, the rifleman should take care not to permit his position to be noticed, as the bullets which whistle around the firer finally unsettle and unnerve him. Consequently, the appearance of the mask or the natural shelters

(heaps of earth, tufts of grass . . .) behind which cover is taken, should not be modified; the earth thrown up should be disguised, and precautions should be taken so as not to attract the attention of the enemy. The shelter should look like the surrounding ground.



The rifle very often reveals the position of the firer. He should avoid raising the rifle when he is loading it, and should slip it into the loop-hole on a level with the ground without ever lifting it up. The barrel should be masked from the enemy's view, and the end never allowed to pass beyond the parapet of the shelter. Care should be taken that the firing of the rifle does not raise dust on the ground (for this reason some tufts of grass should be placed near the muzzle).

FINDING THE AIM OF THE RIFLE.

The sight settings of 200 and 400 meters are not precise enough to permit of always striking a small object such as the head of a sheltered adversary; it is necessary to aim a little higher or a little lower. To ascertain the point at which one must aim in order to hit is known as getting the aiming point. To do this, fire at a mark situated at the same distance as the object in view and where it is easy to recognize the point of impact of the bullets (a hillock).

HOW TO WATCH FOR THE ENEMY.

Even at short distances, it is difficult to discover the German riflemen; their position is most often indicated by the visibility of their shelters and of their rifles, as before stated.

As soon as an enemy has been located, take aim, wait until he shows himself, and fire as soon as he appears. Take no notice of another until the first has been disabled. After having got rid of one adversary, pass to his neighbor, going from right to left. In this way, in proportion as the soldier becomes the master of the situation, he is less and less exposed to fire from the front.

MOMENT WHEN ONE SHOULD FIRE.

When the soldier does not see the enemy, he watches and waits for him; he fires only at the moment when he appears, that is to say, when he exposes himself to fire or to advance; in general, the raising of the rifle gives the warning.

When a movement takes place or is about to take place in our line, the adversary does not fail to shoot, and he is obliged to show himself.

To shoot an enemy who is running, one should not try to hit him "on the wing"; a point where he will pass should be aimed at and the shot fired at the moment he is about to reach the point.

At the finish, when the enemy flees, one should fire as rapidly as possible; when the enemy is on the point of being destroyed, he leaves only a few men on the ground. One should take good aim, as in this way, even if one is unnerved and shoots into the mass, the fire will be deadly.

When one is hidden and the enemy is advancing without distrust, he should be allowed to venture into the open and only struck down when he is a short distance away (and this should be done with patrols).

WHAT ONE SHOULD FIRE AT.

The rifleman generally aims at the adversary he has chosen in the objective indicated; but he should abandon his objective on his own initiative in the following circumstances:

Appearance of Officers and Noncommissioned Officers.

They can be recognized by their gestures and because they are generally in the center of the groups and start first. They should be fired on in order to disable them and render their vicinity untenable.

An Enemy Group on the Move.

Fire should be concentrated on these groups.

It can be seen that the enemy is getting ready to make a rush by the movements which take place in his line and by the rifles which are raised.

After the enemy has executed a rush, a close look-out should be kept, because there are always late-comers who will try to rejoin the others, or new fractions which will start in their turn.

An Attempt at Infiltration.

Sometimes the enemy tries to creep up man by man or in little groups, either by running or by crawling along a covered path. Each man should be watched at his departure and at his arrival.

Machine Guns.

Fire should be opened immediately on any machine gun which is installed or which enters into action.

Signalers, Runners.

Fire should be opened on any adversary who executes signals, as well as on any isolated man who is moving about the battlefield, as it is possible that he is a liaison-agent or an officer of some kind.

Enemy Showing a Flank.

Every opportunity should be taken to fire on the flank of an enemy fraction; to do this, advance or move to one side, if possible. *The fire of a single man* at the enemy's flank may force a whole line to retreat.

EXAMPLES OF THE ADAPTATION OF A FIRING POSITION.

To shoot well, one should begin by making good use of his spade.

1

RIFLEMEN'S HOLES.

The riflemen help one another with the shovels, which they use in such a way that, of two riflemen placed side by side, one digs while the other fires.

II.

MANNER OF APPROACHING A CREST.

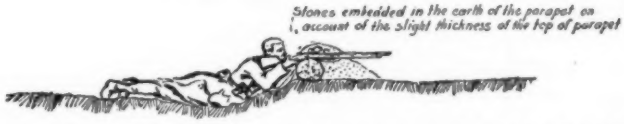
The rifleman should not lie down directly on the summit of the rise, but he should approach it gradually by crawling. At short ranges, dig behind the crest and push the excavated earth to the front, up to the moment when the enemy can be seen.

III.

ADAPTATION OF AN EMBANKMENT.

IV.

HOW TO MAKE USE OF A TREE-TRUNK.



Notice that this rifleman allows the end of his gun to protrude, which is objectionable.

V.

HOW TO MAKE USE OF A HEAP OF STONES.

Notice that this rifleman, while loading, avoids showing the end of his rifle.

How the Rifleman Approaches the Enemy.

A certain number of soldiers only have the one idea: *to hide themselves.*

One comes to the battlefield to fight. Consequently, accidents of the ground should only be made use of for the following purposes:

To take up a comfortable position and to shoot well;

To get close up to the enemy without being killed.

OPPORTUNITIES TO ADVANCE.

Riflemen *get the idea that they ought to await an order before they advance;* now, as the officers are sometimes missing and often cannot be seen or heard, it results that groups remain stationary for days at a time.

The rifleman ought to advance on his own initiative without orders every time that he has a shelter some paces or some dozen paces in front. He should always endeavor to gain a little bit more ground.

THE DIFFICULTY OF ADVANCING BY ONE'S SELF.

It is very difficult to advance at short distances. When a rifleman is lying in a hole he can breathe freely, he is at last in shelter. It seems to him that the air above him is full of bullets, they graze him and cause him to flatten himself down even more; he is under the impression that he would be certainly struck if he were to get up into that sheet of lead.

Where is the enemy? He can scarcely be seen, and yet the moment the rifleman shows himself, the bullets begin to whistle; these invisible rifles, always on the look-out, disturb him, and he no longer dares to venture into the uncertain space. Moreover, the next shelter appears to him to be at an extraordinary distance; his equipment is heavy and gets in his way; he is awkward and heavy at the time when he wishes he had wings to get up and run.

Thus the rifleman feels quite at his ease in his shelter, and when he has made a good position, he hardly thinks of leaving it.

Riflemen must not be discouraged if they are subject to these disagreeable impressions. The moment of departure is hard; once one is under way, however, and running, one no longer hears the bullets whistling. But if the riflemen give up the idea of marching in order to stay under cover, it is then that *cowardice begins.*

WHEN SHOULD AN ADVANCE BE MADE?

To attain the shelter the rifleman has in view, he should begin by destroying or terrifying with his rifle all those who might do harm during the rush.

One can start off without any risks:

As soon as the enemy gives up firing, or fires very high in the air. (It is, however, difficult to become aware of this, as the rifleman always imagines that the bullets are passing close to his ears.)

A surprise rush can also be made during a silence or lull in the rifle fire; the enemy, who was not on the look-out, snatches up his rifles, but it is too late; however, late-comers, or those who are going to follow, should take care.

Advantage should especially be taken of moments when the enemy's position is being bombarded by our artillery.

THE RUSH.

Before starting, the rifleman should have definitely fixed on the place where he is going to take up his position.

When the movement is not commanded by a noncommissioned officer, the signal for departure should be agreed on with one's comrades, so that there will be no late-comers.

Neighbors should be warned so that they will be ready to fire if the enemy appears.

The attention of the enemy should not be aroused by getting up or by raising the rifle.

Cartridge pouches should be well closed, and tools fixed firmly to the belt.

The soldier should run for all he is worth during the rush.

The riflemen should spread out.

Immediately after arrival, the shelter should be prepared and enlarged to permit others to join the new line.

INFILTRATION.

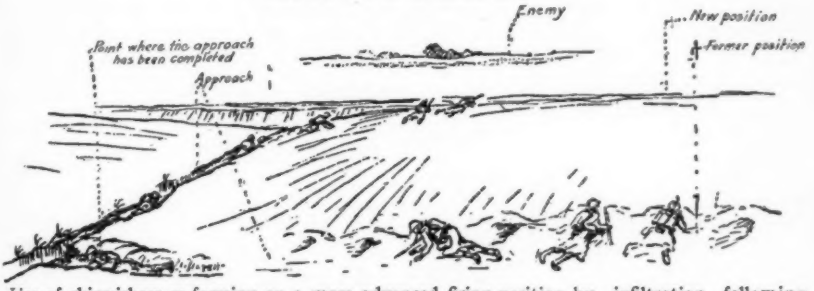
It is sometimes possible to gain a new position without having to cross the open ground. When there is an avenue of approach which permits of a more advanced line being formed, the riflemen crawl nearer and nearer by means of it up to the new line. If the

approach is not continuous, it should be completed by digging at the uncovered parts. Avoid with the greatest care approaching a shelter one after the other, whether running or creeping, when the advance can be perceived by the enemy. The first man gets past, but the second falls on the way.

pell-mell in shell holes and old trenches; suffering heavy losses, they scarcely replied to the enemy's fire, but fired into the air from the bottom of the shelters, and our wild bullets did no more than break the branches of the willow trees over the heads of the Bavarians.

Two riflemen had succeeded in taking

PROGRESSION BY INFILTRATION



Line of skirmishers re-forming on a more advanced firing position by infiltration, following single line of approach.

USE OF THE SAND BAG DURING THE COURSE OF THE ADVANCE.

Sometimes one is separated from the enemy by a great space of open ground. It is difficult, in this case, to take up a position at a short distance from the enemy in order to prepare the assault; any man remaining stationary on open ground is very soon disabled. The sand bag should be filled before leaving the last shelter, and a few stones should be put in with the soil in order the better to stop the bullets. The sand bag, carried under the left arm while running, will form a first shelter during the halt and one which it is easy to complete.

THE RIFLEMEN OF YPRES.
(7 November, 1914)

On the 7th of November, 1914, our line of attack had halted 300 meters away from the German trenches, from which there came a formidable and accurate fire. Our men were piled up

up a position in a shell hole in front of the line. One of them *settles himself so as to fire from the flank;* gently he makes a slanting loop-hole in the ground at the edge of the excavation without *changing the aspect of the shell hole so as not to attract the attention of the enemy.* Then he *gets the aiming point for his rifle* and begins to watch. He soon locates an adversary on his right hand, covers with his rifle the spot where he has disappeared, and waits. Every time the enemy shows himself, he fires a quick and accurate shot; in this way the rifleman successively covers, from right to left, all the heads that appear. The Bavarians cannot understand where these bullets come from. They redouble the fury of their fire on the shelters where our line is gathered; then, becoming more prudent, they take off their helmets, and only a quick glimpse of them can be obtained in a rapid exposure, which, however, is often

too long. In their turn, they break the branches of the trees over the heads of the Frenchmen, their fire slackens, and ceases at last completely.

During this time, the two riflemen, taking turns at digging and at firing, *have enlarged their hole, and two men have been able to join them; the enlargement of the trench is actively continued.* At last, when the shelter is sufficiently large, a group of noncommissioned officers and about fifteen men join them at one bound.

In front of them the fire from the German trench, after some quickly checked attempts at reply, seems extinguished; silence gradually spreads over this corner of the battle field, and a lull sets in.

Towards mid-day, the group suddenly gets up; in two rushes, running as fast as they can, on open ground, the men reach a line of old abandoned French shelters thirty meters from the enemy. The Germans, surprised, only fired at the last moment; two men are wounded. All day long this weak group succeeds in holding a position at a short distance from the Bavarians, who dare not chase them off; only one man is wounded.

At night, under the protection of this group, the whole company creeps forward; they dig in silence, rifles at their side, bayonets fixed. When daylight comes the enraged Germans see a whole trench which has been dug under their very noses, and the points of the bayonets which defend it.

That is what the audacity and skill of at first two riflemen, then of a little group, *were able to accomplish, almost without losses, in critical circumstances where most of the men had lost their heads and were no longer defending themselves.*

Grenade Combat.

The grenade is the infantryman's weapon, as well as the rifle and the bayonet. During the fight one should always have grenades in the haversack and know how to use them.

THE USE OF THE GRENADE.

The grenade is used during the defense to form a barrier in front of the trench which the enemy cannot traverse. In the attack, the grenade is used to drive the enemy out of a trench, a shelter, machine-gun nest, a house, or a cellar.

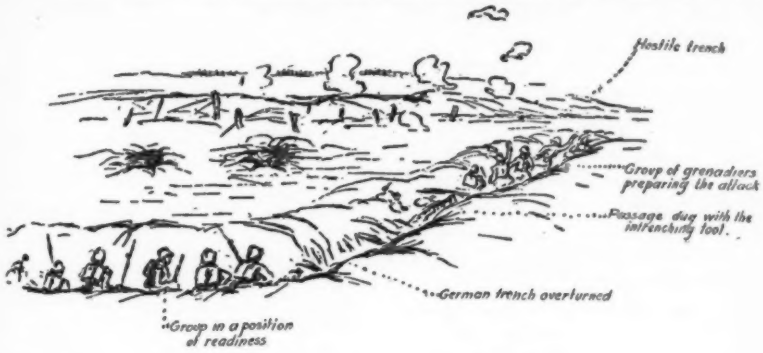
PREPARATION OF AN ASSAULT WITH GRENADES.

Sometimes during the course of a combat, an intrepid group succeeds in locating itself quite close to an enemy trench; the preparation by the artillery cannot be carried out, and the assault under such conditions is dangerous. An attempt is therefore made to overwhelm the enemy with grenades and then attack with the bayonet.

A few riflemen, supplied with grenades, try to get within throwing range of the enemy by making use of all the accidents of the ground, shell-holes, or trenches abandoned by the enemy; if necessary, they complete their line of approach with the help of intrenching tools. If it is impossible to approach by day, they wait till night comes to creep silently into a shelter quite near to the enemy. During this time the rest of the group await under shelter the moment of assault.

The grenadiers overwhelm the enemy with a continuous hail of well-directed grenades and compel him either to evacuate his position or to take refuge in his shelters. This is the moment for the assault.

PREPARATION WITH GRENADES OF AN ASSAULT BY A GROUP OF SKIRMISHERS


Hostile trench
Group of grenadiers preparing the attack
Passage dug with the infantryman's tool
German trench overturned
Group in a position of readiness

The group loads and fixes bayonets; at a given signal all the men rise together. They rush without shouting, reach the enemy taken by surprise, bayonet him and shoot him before he has even thought of defending himself.

GRENADE FIGHTING IN A BOYAU (BRANCH TRENCH) OR A TRENCH.

Sometimes during the course of a combat an advance has to be made through the trenches or the *boyaux*. The enemy should then be made to retreat step by step, and the barricades he has established should be successively taken by grenade fighting.

The riflemen are then divided into three groups:

A leading group;

A supply chain;

A group which fills up the sand bags.

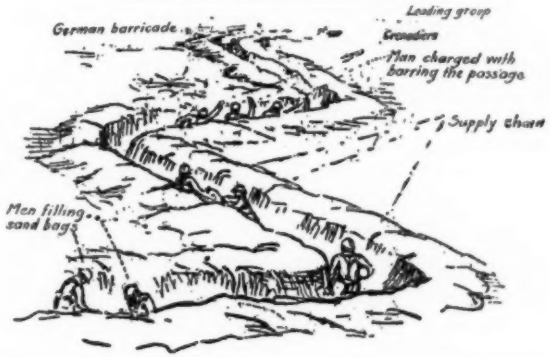
The leading group consists of:

One man (fusileer), armed with a rifle or a revolver, whose sole duty is to bar the passage to the enemy and to protect the grenadiers;

Two grenadiers (throwers), who throw grenades on the enemy's barricade and in the communicating trench behind in order to interrupt ammunition supply.

To blow up a sand-bag barricade, charges of petards or Cellurier bombs, thrown by hand and primed by a group further to the rear, can be used to advantage.

COMBAT IN A COMMUNICATING TRENCH



The supply chain is formed by a few men (ammunition carriers), separated by intervals of several paces so as to be able to get out of the way of enemy projectiles without interfering with each other. They pass along haversacks or sacks filled with grenades.

The third group is engaged in filling sand bags so that a barricade can be rapidly established; they fire rifle grenades to impede the supply of the enemy and to block his paths of retreat.

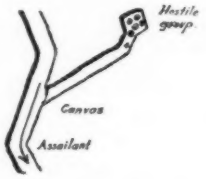
The most profound silence is observed, and all noise coming from the enemy is attentively listened to. When the leading group judges that the enemy is overwhelmed, a man slips forward, crawling through the smoke, gives a quick glance round the turn, and signals to his comrades. In this way progress is made from turn to turn and from traverse to traverse.

It is pretty easy to protect one's self from the enemy's grenades; they can be seen coming, they do not burst instantaneously, and there is time to take refuge in a corner; besides, many grenades fall outside the trench. But close formations should be avoided. When a grenade arrives, the men push forward, become entangled with one another, and the grenade hits everybody. When the enemy has a momentary advantage the barricades formed of sand bags should be increased and the trench obstructed either by heaping up the sacks or by caving in the walls. The enemy's march will thus be retarded; he stops to free the passage, which often permits his adversary to recover the advantage, or else he is obliged to show himself uncovered before the rifles.

Simulate the groans of the wounded in order to entice the enemy into an ambush.

PRECAUTIONS TO BE TAKEN DURING A STRUGGLE IN THE INTERIOR OF THE TRENCHES.

One should be suspicious of the long straight parts of the trenches; they are a snare to entrap the assailant; he rushes into them, believing himself to be under cover, and is massacred. These parts of the trenches are often enfiladed by rifles or machine guns placed in the traverses.



Attention should also be given to the junctions of the communicating trenches. The enemy often retires to the end of an oblique lateral *boyau* (branch trench). When the assailant is advancing rapidly in the communicating trench, he sometimes neglects these branch trenches which open off the one he is following. The enemy comes out of his hiding place and blocks off the assailant when he has gone past. The Germans sometimes disguise the entrance to these retreats by a piece of cloth. When one comes across a new *boyau*, a few grenades should be thrown to the end of it; it should be explored, and a simply guarded barricade established, if it is not considered necessary to continue along the lateral *boyau*.

THE ASSAULT, THE FRAY, THE PURSUIT.

When a strong line of attack has succeeded in placing itself at about a hundred yards from the enemy (in order to permit the artillery to fire) and when the artillery has sufficiently prepared the ground, the assault is made.

THE CHARGE

At 60 meters the charge commences. The rifle is dropped to the height of the waist. The troops run straight on the hostile trench; every enemy who shows himself receives a rifle shot.

The charge is made when 60 yards away. The rifle is dropped to the height of the waist. The men run straight for the enemy's trench; any adversary who shows himself receives a rifle shot.

ASSAULT.

The infantry rush forward in successive lines of skirmishers which are called waves. Each wave leaves the trench *at a walk; lines are formed,* then double time is taken up and a certain number of rushes executed, according to the distance. In spite of the run, in spite of the bullets, in spite of the men who fall, the alignment should be maintained until the end. Not one behind, not one ahead but all together like a wall. *The barbed wire must be reached without firing* in order not to lose time.

The first barbed-wire defense[1] is traversed if it exists, the lines being reformed beyond it. Then the men set off again; 60 yards from the trench, the charge takes place; in one movement, bayonets are brought to the charge, and the men throw themselves upon the enemy.

Each man runs straight for the part of the trench before him; he watches the loop-holes and the parapet; if a head or a rifle shows itself he fires to make them disappear and then jumps upon the parapet. By rifle shots and bayonet thrusts he destroys everything in his way; *no one must be left behind who can shoot you in the back, as has often happened.* (It should be ascertained if the Germans lying in the trenches are really dead.) If all the enemy surrender at once, they should not be massacred but quickly disarmed. Men chosen in advance and the trench "sweepers" alone busy themselves with the prisoners, as it is usual for cowards to be very willing to bring back the prisoners they have not taken.

Machine Guns.

A machine gun which opens fire should be the target of everyone; it should be covered with a hail of bullets.

THE FRAY AT THE ENEMY'S POSITION AND THE PURSUIT.

The trench, cleared of defenders in a few seconds, is passed *without delay;* the men *lie down ten yards further on*

[1] The crossing of the barbed-wire defences.—One must not expect to find that the barbed wire defences have been entirely destroyed; the artillery contents itself with making holes in them. Each man should locate the hole through which he should pass.

RALLY AFTER CAPTURE OF A TRENCH

The trench captured, the attackers lie down ten meters beyond it, open fire on the next trench, and when the line is re-formed, renew the assault.

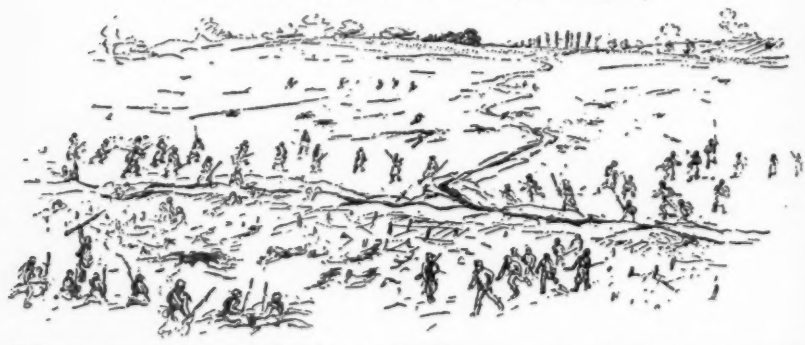
and open fire on the second trench. When the line has been re-formed, the men start off again for the assault, in good order, formed in line as before.

It is absolutely forbidden to enter the communicating trenches; this is an easy temptation, but *one never gets out again,* and a handful of men may stop a company for hours.

Men chosen in advance follow up the communicating trenches according to a fixed itinerary; they prevent the enemy from enfilading the space between two trenches.

The violence of the assault creates great confusion among the enemy; he doesn't know who is holding good and who has fallen. This confusion must be taken advantage of *to penetrate as far as possible;* by stopping on the way, the barrier of fire will soon be re-established. But the men must not *go*

PURSUIT AFTER CAPTURE OF A POSITION (ALL TRENCHES)



Rally while marching in line of skirmishers, behind the noncommissioned officers of the company. The different waves separate and re-form. Patrols protect the movement.

forward in disorder, isolated, like madmen; they would be at the mercy of the least fusillade or the slightest offensive return. Therefore:

They should always rally around the officers and noncommissioned officers of the company;

Reform a line of skirmishers whilst marching;

Advance rapidly on the heels of the adversary, in good order, on the lookout, the rifle in readiness.

Designated patrols creep rapidly forward; they cover the rally and the march of the lines of skirmishers; they endeavor, without exposing themselves, to attain the important points (junctions of communicating trenches . . .), the occupation of which will prevent the arrival of reinforcements and cut off the retreat of certain groups of defenders.

Each soldier should be well acquainted with the plan of the enemy's trenches; he should be able to find such a shelter, such a machine gun, such a trench junction.

Places Where Information is to be Taken.

Each soldier, before starting, should know the exact places where he will be sure to find someone who will have the fire of our artillery stopped when it is firing too short, or have fire opened when an opportunity presents itself.

DELINQUENCIES THAT EACH SOLDIER SHOULD PREVENT.

During the fray and the pursuit, a certain amount of confusion occurs in the assaulting troops. A small number of bad soldiers are sufficient to cause disorder. The timorous ones frighten the others by crying: "They are coming back . . . the asphyxiating gases . . . the company is annihilated . . . all the officers are killed . . . we are surrounded." These timorous ones *must be made to keep quiet;* if they fall back, *they should be caught hold of and brought back to the front* in order to prevent panic. The cowards profit by the confusion and the disappearance of the chiefs to remain hidden behind under some pretext or other; they are eager to accompany the wounded or the prisoners; they make a pretence of putting the trench into a state of defense or say that they have lost their way. All such men will be collected by detachments of police.

THE COUNTER-ATTACKS OF THE ENEMY AND FLANKING FIRE.

Groups of scattered skirmishers have a tendency to withdraw precipitately before the least counter-attack or when they come under a flanking fire, because the chiefs have fallen and they are not very numerous and are afraid of being surrounded. One soldier who turns back is sufficient to sweep along the others.

The ground gained is stubbornly held; *there must be no retreat.* When there are no more officers or noncommissioned officers, there are always intrepid soldiers to stop those who are afraid and to say to them: "I shall kill the first one who falls back." Isolated groups of skirmishers retrench themselves in a corner of the trench; surrounded, they defend themselves until they have completely exhausted the ammunition; they make use of the rifles and cartridges of the Germans.

Four sheltered men setting the enemy at defiance and firing only accurate shots, are absolutely unapproachable.

Administration and the Management of Men

By Colonel David C. Shanks, Infantry

THE American Army does nothing by halves. Whatever it undertakes to do is done with its whole might. More than thirty years ago, the discovery was made that the Army lacked training in small-arms target practice; the deficiency was remedied with a rush. For many years the entire Army blazed away, spending a large part of each summer on the target range. Every other kind of training was neglected while the various organizations conducted a furious campaign for a creditable "figure of merit."

A few years later, it dawned upon some one that the Army was under-educated—not enough attention was being paid to the theoretical education of officers. The Army soon became a great school with lyceum and lecture courses. Garrison schools and post-graduate work paved the way for the Army School of the Line, the Staff Class, and the War College. Following in due time came the demand for the abolition of much that was useless and wearisome in the incessant close-order drills, and the substitution therefor of a practical course in field training.

These were all steps in the right direction, and met a real and genuine need; a useful work was accomplished. The Army is far better by reason of the attention that these various subjects have received, and the enthusiasm expended upon them. There is still room for a wider and more comprehensive course of instruction in every branch of army education and training.

It has seemed to me, however, and the impression has been growing much of late, that there is one real, ever present need that does not receive the consideration that it deserves: I mean the management of the soldier as a man apart from his training as a soldier. There is much, very much, that remains to be done in the improvement of our men in discipline; in contentment; in neatness of dress and general appearance; and in such higher regard for the oath of enlistment as will bear fruit in substantial reduction in the percentage of desertions. These are problems which are ever present.

In inclement weather, on Sundays and holidays, and after the recall from drill, the task of training the soldier is suspended. The task of his management as a man is present for each hour of every day in the year.

The management of men is a vast unbounded sea upon which the young officer sets sail without pilot and without chart. So far as I know, there is no text-book nor treatise to guide him in this, the most important feature of his profession. Neither at West Point nor at the service schools does the subject receive any considerable attention. If there were any such text-book at West Point, one of its most important chapters should be devoted to pointing out the faults of the "yearling corporal" idea in the treatment of men. The harm in the yapping, yearling-corporal method is more dangerous to the older cadet who uses it than to the "plebe" to whom it is applied. Long indulged in, it becomes a fixed habit, and the graduated cadet, thus afflicted, brings with him to his new regiment an idea and a manner that works no good to himself and only harm to his men. There are unfortunately some officers who have never been able to rid themselves of the yearling-corporal manner and who seem to feel that petulance and impatience are indicative of efficiency. Such officers forget that no man can

successfully control others who cannot control himself. They forget, if they ever knew, those paragraphs of the Regulations to the effect that "military authority will be exercised with firmness, kindness, and justice" and that "superiors are forbidden to injure those under their authority by tyrannical or capricious conduct, or by abusive language."

The Army will soon receive a vast influx of new officers, and the lump must be leavened. We have books galore on all sorts of technical subjects; but in the most important and most difficult of all subjects, there is not even a pamphlet. Men are the tools of the military profession, yet there is no instruction as to how they may best be used. A few paragraphs of the Army Regulations, such as those to be found under "Interior Economy of Companies" and a scattered general order or two, complete the literature available.

Fortunate indeed is the young officer who joins a company commanded by a capable and experienced captain. There he may have opportunity to learn by experience. But after the long list of promotions has taken effect, experienced captains will be rare—they will all be majors. In time of active service, we all know what inordinate drafts are made for officers on account of those needed on detached service. It is always the experienced officer who is taken; the inexperienced is left behind.

In the Philippine insurrection, the green second lieutenant was left to command the company while his captain or first lieutenant went on detached service as "Captain of the Port" or "Collector of Internal Revenue" or some other equally important duty. It is not a matter for wonder that some organizations were not as well commanded as might be; he would be a genius indeed who can successfully command men without experience and without assistance. But even in time of peace, when the company has its captain with it, there would be profit—much profit—if the handling of men received more attention. In my judgment, there is no other field so fertile, none that promises such good returns and yet remains uncultivated.

An experience of something over three years as an inspector has shown me how varied are the results attained under conditions that are identical. In the same post, under the same commanding officer, wearing the same uniform, fed with the same rations, drawing the same pay, and occupying barracks alike in construction are to be found organizations widely different in respects of discipline, contentment, setup, neatness of appearance, and general efficiency.

Our regulations state that the commander of an organization is responsible for its training, its management, and its efficiency. Common sense will tell us that no petty rules of thumb can be laid down to tell any officer how he may successfully manage men. That is an art to be learned, if at all, only by experience; and the final results will depend, in large measure, upon the personal equation of the officer. There are some officers who will never succeed with troops—they lack a certain undefinable something that spells the difference between success and failure. This is oftentimes not due to lack of effort. Some of the hardest working officers I have ever known have been among the greatest failures with troops—they nagged their men to desperation. Any man would be foolish to imagine for a moment that he can set down on paper rules

that will insure the successful running of an organization. I shall certainly not attempt it. But to deal merely in generalities—to find fault and to suggest no remedy—is a waste of time and paper.

It is therefore with some considerable hesitation that I undertake to set down, not rules, but what I believe to be some salient principles. There is not an original thing among them. They are merely the ideas that have been impressed upon my mind by the opportunities I have had of seeing and comparing various organizations and of noting the good and bad points of each.

I.

There Should Be a Proper Distribution of Duties, Giving to Each Officer and Noncommissioned Officer His Appropriate Share.

In the tactical training of officers and men, there is no principle so universally recognized and insisted upon as the allotment to each subordinate of his appropriate duty and non-interference with him so long as he does well. It is a correct principle and works well. It is the means we rely upon to give to the subordinate the opportunity and the experience necessary for developing efficiency and confidence in himself. But in the ordinary routine administration of most organizations, this principle is neglected entirely. In many companies, the captain and the first sergeant monopolize all authority. There is no intermediary. Nobody else attempts to exercise any authority. The lieutenants rarely assist the captain except at drill. Subordinate noncommissioned officers refer every question to the first sergeant. The corporal is frequently never called upon to exercise any authority except on guard or in charge of fatigue parties. At drill he gives the commands "Squad, halt" or "Follow me"; when the recall sounds, his authority ends, his duty is done. No one but the captain and the first sergeant receives any training or any experience in the handling of men because no one else has the opportunity. When the time comes for a lieutenant or a subordinate noncommissioned officer to step into a more responsible place requiring the control of men, he has no conception of the command function because he has had no actual experience. A man may stand on the bank and watch others swim week after week; but to learn how to swim, he must himself go into the water.

In the old days when companies were small—not exceeding fifty men each—and when the companies were filled with old soldiers, it was not a difficult job for a good captain and an efficient first sergeant to manage a company on the individual plan and without help from subordinates. Even now, with some of our organizations at war strength, good results are occasionally obtained in the old way. I have in mind one or two organizations managed on that principle which are remarkable because they show the remarkable efficiency of the captain and the no less remarkable efficiency of the first sergeant. But what would happen to such a company if the captain and the first sergeant left it simultaneously? Within a fortnight it would go to pieces because no one else has been trained to step into the breech.

Let us see what the regulations require:

II.

Paragraph 287. A thorough police of barracks will precede the Saturday inspection. The chiefs of squad will see that bunks and bedding are overhauled, floors, tables, and benches scoured, arms

and accouterments cleaned, and all leather articles polished.

Paragraph 288. *Chiefs of squads will be held responsible for the cleanliness of their men. They will see that those who are to go on duty put their arms, accouterments and clothing in the best order, and that such as have passes leave the post in proper dress.*

There are few organizations where these paragraphs of the regulations are enforced. When a captain picks out a private and makes him corporal, he cannot tell in advance what sort of non-commissioned officer he is going to make.

Neither can he tell much about the corporal if he hears him say only "Squad, halt," or "Follow me." I have many a time heard a captain say that he was surprised and disappointed in the poor showing made by some sergeant who had just been promoted from corporal. The time to try out the corporal is when he is a corporal. Give him the seven men of his squad; tell him they are his to look after, to instruct, and to manage. Tell him he is to look after the condition of their bunks, their equipment, their cleanliness and their behavior. Put the corporal on his mettle. When his squad is unusually good at inspection, it will do no harm to say, "Corporal, your squad was in good shape to-day." All of us like an encouraging word now and then. When the corporal's squad is not in good shape, tell him so, and tell him what was wrong. In other words, give the corporal a real job. If any man of his squad has muddy shoes at the foot of his bunk, or hair that needs trimming, or grease spots on his coat, speak to the corporal about it. The commissioned officer ought never to do the corporal's work; it is sufficient if the officer sees that the corporal does his work and does it well. It is only by holding the corporal strictly to his job that he will get the idea that it is really and truly incumbent on him to look after his squad in the way that the regulations require.

I have seen some organizations in which excellent results were attained because the captain instituted a healthy rivalry between various squads of his company. A tactful captain can do much in this way, for competition is a keen incentive, and the men of the squad as well as the corporal become interested in winning for themselves the credit of being regarded as the "crack" squad of the organization.

In some well-managed organizations, the men are graded into several classes or sections. The men of the favored section have more in the way of privileges than those in the next section, while those in the bottom section have no privileges at all except by special permit. When this plan is judiciously worked out, it produces good results in the hands of a captain who has the entire confidence of his men for they then strive to get into the more favored class. Having gotten into one of the favored sections, they strive to remain there, lest they lose caste and privileges at the same time.

I have found no organizations where the chiefs of squad are required to see that men going on pass leave the post in proper dress. Yet why not? The regulations require it, and the corporal has but seven men to look after. Why not make him do it, and do it thoroughly? Then when the time comes to make a sergeant, it will not be such a leap in the dark. If a corporal, after a little seasoning, cannot look after seven men and do it well, it is certain he will not satisfactorily perform the larger duties of sergeant.

In proper sequence, each line sergeant should have under him the squads assigned to his charge. In the supervision of these squads, he should as far as possible deal with the corporal. The captain should deal with both. In short, every noncommissioned officer should have a job. When anything goes wrong, every man whose business it was to supervise that particular work should be held up, and responsibility for the failure established.

It takes a tactful captain to get the proper work out of his lieutenants. Many are assigned no work at all except at drill or at tactical instruction. There can be but one officer in command of a company, but that is no excuse for letting the lieutenants remain ignorant and go to rust for lack of opportunity to learn their profession. The best training for inexperienced lieutenants will be given by assigning to each in turn certain duties as the captain's representative in the management of the company mess, the daily inspection of barracks, kitchen, mess hall, etc., office work, preparation of rolls, returns, routine papers, etc. One excellent form of training for a lieutenant is to place him in charge of gymnastics, athletic events, and company amusements. Perhaps the proposed vocational training may open a new field for the activities of lieutenants. It will give opportunity for the handling and the management of men. No inexperienced officer can afford to neglect an opportunity to gain the experience he needs so much.

Following out the scheme above outlined and required by the regulations, every officer and every noncommissioned officer will have something to do. The captain will have supervision and control but will exercise it in such a way that all of his subordinates are receiving training of the right kind—a training that will enable the machine to continue to run smoothly even though the captain and the first sergeant should be simultaneously called away.

Turning to the battalion, a step higher in routine administration, let us see what the regulations require.

III.

Paragraph 245. *A battalion commander is responsible for the instruction, tactical efficiency, and preparedness for war service of the troops of his battalion under his immediate charge. Correspondence relating to the personnel, instruction, discipline, or equipment of a company, battery, or troop in battalion or squadron will pass through the battalion or squadron commander. No official record, however, of such correspondence will be kept by the battalion or squadron commander.*

If there is a single post or a single regiment where this regulation is fully complied with, I have never seen it.

A major ought to have an opportunity to know his battalion. If he does not, he goes to rust like the cogs in a wheel which never moves. Not only in the general case are the above requirements neglected, but it is not rare to find post headquarters dealing directly with first sergeants of companies in matters which should receive the attention of the company commander. It is faulty administration which brings this about.

We are all familiar with that class of commanding officer who wants to do everything and run everything himself. If he wants teams or transportation of any kind, he telephones or sends direct to the corral. The quartermaster learns about it incidentally. If he wants any information about men or things in a company, he gets it direct from the com-

pany clerk or the first sergeant. No system is better calculated to make worthless or inefficient subordinates than to neglect and ignore them.

Many years ago, I recall being at a post where the weather was intensely hot. It was before the days of cotton uniforms, and the troops wore the heavy blue blouse. Post orders required that the blouse should always be kept buttoned, and the post commander was quite watchful in regard to his order. As the weather was hot, the order was violated to a great extent. Whenever the commanding officer observed a soldier with his blouse unbuttoned, he would send his orderly in a hurry for the man and give him a good dressing down and occasionally a trial. His orderly was generally very busy. Every little while, there was issued a fresh memorandum circular calling attention to the failure to keep blouses buttoned, but no company commander was held to any accountability.

After a time, the permanent commander went on leave, and was replaced by the second in command. He did not issue any fresh circular. It wasn't long before he saw a man with his blouse open, and he found to what company the man belonged. He said nothing to the man, but to his orderly he said: "My compliments to Captain A and say I want to see him." When the quiet interview with Captain A was over, there was no doubt in the captain's mind as to his duty in the premises. I heard the interview, and I saw the difference between the method of one commanding officer trying to run a post on the personally conducted plan and another requiring his subordinates to do their proper work while he exercised general supervision.

IV.

Inculcating Pride of the Soldier in Himself and His Organization.

The American Army is one of the most conservative institutions in the whole world. Customs and methods change more slowly in the Army than in any other place I know.

For a long time the only way of maintaining discipline was by punishment.

Fear of what would happen in case of dereliction was the main incentive to do right. Looking back over my four years at West Point, I can recall but a single bit of advice relative to the management of men. It was from an instructor in law who advised his section to strive as young officers to establish a reputation of being absolutely impartial—to prefer charges for every absence and every dereliction. In this way the men would know what to expect, and would have no grievance. Even now we have officers who know no other method. The green recruit and the "old soak" are all in the same boat; to them all soldiers are as alike as pawns on a chess-board. To such officers any attempt to consider the human, the personal element in the soldier is childish; any attempt to control by other means than that of fear is pooh-poohed as balderdash or "weak attempt at moral suasion."

To be sure there is to be found, now and then, a soldier to whom all appeals are useless. To such a man the methods of force are obligatory, and should be applied freely and unhesitatingly. But, if he is given opportunity, the average soldier will respond surprisingly well to appeals to his pride.

Of all ordinary offenses, drunkenness is the one that is most prevalent and that gives most trouble to the company

commander. The drunken soldier must be restrained, and must be punished. The object is to keep him from getting drunk again, and to save him from becoming a chronic drunkard. In my own experience as a company comander, I never found any other method as useful to me when a soldier had sobered up as to bring him alone into the orderly room, look him squarely in the eyes, and say: "Jones, don't you feel ashamed of yourself? Your conduct is hurting yourself and your company too." The man in uniform is just as much subject to remorse as the man in civilian clothing. It was a very exceptional soldier who would not say: "Yes, Captain, I do feel ashamed, and I am going to keep sober next pay day." Then was the time to say: "All right, Jones, I am going to watch you next pay day, and see if you are man enough to keep sober." And in Heaven's name, if Jones does come through successfully, don't fail to find opportunity to let him know that his victory has been observed.

It is not a bad plan to do this at inspection in ranks—the men standing adjacent will hear the captain's recognition of Jones's improvement and they may be depended upon to tax him thoroughly should he fall again. A little touch of the human element now and then, a word of encouragement from the captain at the right time, will help many a young soldier to find himself, and bring him to feel something of that personal pride in himself and his record which is the very foundation of every good soldier.

Speaking of the pride of the soldier in himself leads me to remark that the captain needs a bit of pride as well. There are some company commanders who are always preferring charges. The average soldier soon loses interest in his efforts to keep a clean record when every little dereliction is sufficient to bring him before the summary-court officer. Under existing regulations, there is much power in the hands of the company commander; company punishment and the withholding of privileges will control all except the hard cases. The captain who is always preferring charges thereby acknowledges that his men have gotten past him and that he has had to call for help—thereby losing an asset of great value. A company likes to feel that its captain is a strong man—strong enough to manage his men without always having to rely upon extraneous aid.

There is one other small matter in which the captain should be careful, and that is the matter of personal acquaintance with his men. There are captains who have been in command of their companies for months but who if they want to speak personally to some man, have to ask the sergeant for the man's name. The captain who cannot call by name every man of his company needs to set about acquainting himself with his company at once.

And now we come to the pride of the soldier in the organization to which he belongs. General Sherman said that an army had a soul as well as a man. If this be so—and it undoubtedly is—then it is just as true that a company has a soul as well as an army. The officer who attempts to manage an organization without ever arousing in it any sense of company pride is doomed to failure. The object of discipline is to command obedience. Of two officers, the one who attains a cheerful, willing obedience is far and away ahead of the one who knows no method except coercion.

We all know the difference between two companies, in one of which the men

are contented and have an intense pride in themselves and their organization, and another which lacks all of these things. It is the difference between the living, breathing, healthful man and the corpse.

In the summer of 1886, I was at Fort Leavenworth attending a rifle competition. At that time, no regiment nor even any considerable part of any one regiment was stationed there. It was the custom to select one company or one troop from each of several different regiments and to send it to Leavenworth as a part of the garrison. In 1886, they were casting about for an infantry company—they wanted a good one—one that would set a proper standard for the student officers. The choice fell upon Company K, 13th Infantry, commanded by Captain Arthur McArthur, Jr. It was a wise choice, and I shall not forget that company, small in numbers but so abounding in spirit and pride as to be notable.

The men all knew why the company had been sent to Fort Leavenworth. Every man felt that a great onus was on him individually. The line at parade showed service stripes on nearly every man from wrist to elbow. When the company was dismissed, no man sallied forth from the barracks who was not so spick and span as to be a marked man at yards' distance. For a man with "K Company, 13 Infantry," on his cap to be sent to the guard house would have been a calamity. There were stories of how one or two, overbibulous after pay day, had been brought in the back way by companions lest some one might see a K Company man at a disadvantage.

When I was a "youngster," I was serving at a large post at the time of the establishment of the Post Canteen. Everything connected with the running of it was new; nothing had been worked out. The War Department authorized no stoppages; company commanders were responsible for their own collections, and the subject of these collections caused a good deal of anxiety. There was a general consensus of opinion: to the guard house and the black list with any man who failed to pay. Pay day came and went. There were many failures to pay, likewise many in the guard house. One captain had three men who failed to pay. He called them into the orderly room one at a time. Each man put up a sorrowful story about having spent all of his money before he reached the canteen. To each one, the captain made the same reply: "I do not like to have men of my company in the guard house; it hurts the man, and it hurts the company." Then he took from his own pocket the money needed to pay each man's canteen bill, and sent him down to pay it. But it did not stop there. The captain then sought the canteen officer, and learned that the men had paid up. He asked the canteen officer to write him a letter to that effect, and the letter also said that his was the only company at the post which owed nothing. This letter was posted on the company bulletin board. It made a hit. The men of the company thereafter would not stand for any man injuring the good name of the company by non-payment of canteen bills. That company enjoyed a fine reputation while other company commanders swore and reviled and put men in the guard house.

It is a pleasure to see organizations which have in them the breath of life—something over and above the showing made by those driven to duty like dumb oxen. We have a good many live organizations scattered about here and there. Of those I have seen on any con-

siderable scale, our troops in China afford the best example. Several years ago, an efficient colonel brought them up to a high standard (under difficult conditions, too, be it said). He instilled into officers and men the idea that American troops in China should be not only as good as, but better than, troops of other foreign governments. This put his men on their mettle and with excellent results. The troops in China make a good showing because the proper spirit is there.

V.

Should a Young Soldier be Talked to? If so, What Shall be Told Him?

What is the usual procedure when recruits join a company? A batch is received at post headquarters. They are lined up and checked over, much as a quartermaster would check over a shipment of mules. No one says anything to them. The adjutant and the sergeant-major tell them off into detachments, and they are sent to their respective organizations. The captain comes along and looks them over; if he is busy, this may be after a lapse of several days. They are turned over to the drill sergeant and are told a few pertinent things about post orders. Perhaps the articles of war are read to them, and they are told of the awful things that will happen if they fail to come up to standard. But has any officer talked to them and told them any of the many things a recruit ought to know and ought to be told at the outset of his career? The chances are against it. They are generally left to drift for themselves. There are exceptions, of course, but these are still only exceptions.

In the fifteen months from March, 1911, to June, 1912, I was stationed at the recruit depot at Columbus Barracks. During that time, I talked to every recruit enlisted at the depot, going daily to the company which had received the last assignment of recruits. Roughly speaking, the number of recruits enlisted amounted to something more than one hundred per week, so that I suppose I talked to more than six thousand men who afterwards went to join the colors. The things I tried to tell them were the things a recruit ought to know. I thought then, and I think now, that every assignment of recruits ought to be talked to, first by the commanding officer, and afterwards by the captain of the company to which he goes.

Consider, for instance, the single subject of desertion. I believe that many a young soldier deserts who would remain faithful to his oath if only some officer would carefully explain to him the difference between an ordinary civil contract and an oath of enlistment—explain it to him, not by printed order, but by word of mouth while the officer looks him squarely in the eyes.

Desertion is one of the troubles that has given the Army a bad reputation for years past. It has been more talked about, and more written about than any other one Army question. All sorts of causes have been alleged, and doubtless all have contributed a share towards swelling the grand total.

In my judgment there is one thing that causes more desertions than any other single thing—perhaps more than all other things combined. With all of his good qualities, with all of his courage, his intelligence, his resourcefulness, there is one respect in which the American is the poorest of all material for making soldiers. From his earliest youth, he has been his own boss. Nothing is so characteristic of the American

as independence of thought and independence of action. These are his heritage, and he parts from them with painful reluctance. Now the soldier can be independent neither in thought nor in deed. One of his first, his most important and most difficult lessons, is obedience; his will and his actions must be subordinated to others. This is a lesson which the American learns slowly and painfully. Many find it a bitter lesson and quit in disgust. It is just here that a preliminary talk of the right kind would have best effect and would keep many a young man faithful to his oath.

Tell the young soldier that it is necessary in the Army to have discipline; that each man must conform his will to higher authority; that the captain who commands the recruit is himself commanded by his post or regimental commander, who in turn is subject to still higher authority. Tell him that this is so in every army in the world and that there is nothing belittling or degrading in it. Tell him that in the Army the only way of doing things is by order and not by request; that every soldier has had to learn this lesson; that it is only the weakling who violates his oath; that the strong man stays faithful and serves his country. Tell the young soldier that some of our best officers came from the ranks, beginning just as he himself is beginning; that he has held up his hand and taken a solemn oath to serve his country; that if he does not keep that oath, he is a quitter despised alike by God and man. If these things were patiently explained to every soldier who enlists, and repeated from time to time, I do not doubt that the percentage of desertions would be appreciably lessened.

There are a great many other things that ought to be said at the same time. I can but touch upon them here, for they are things that will come to the mind of every officer.

The young soldier ought to be told carefully of the respect due to the uniform he wears; that his uniform on the streets of the city makes him conspicuous; that it represents the government he serves; that a soldier who wears his uniform into dives and disreputable places or becomes drunk in public places while in his uniform, thereby lowers it in the respect of all beholders. We often hear lamentations that the people at large do not respect the uniform as they should. This is sad, if true. But in my judgment, the place to start the idea of a proper respect for the uniform is in the Army—not out of it. The soldier we can control, the civilian is beyond our reach. As long as our noncommissioned officers and our best men are content to see their comrades reeling drunk in the streets and take no action, we cannot think it strange that the civilian does not always enthuse. Is there any remedy? I think there is. But the remedy lies in the Army, not out of it. In one of the best managed posts I have ever seen, there was a post order positively prohibiting the uniform from being worn into dives and disreputable places. More than this, the order was enforced. Two selected sergeants were placed on special duty. Wearing civilian clothing, they patrolled the unsavory sections of the city in the afternoon and evening with the cordial co-operation of the police force. Every soldier wearing uniform in the red-light district was arrested, confined, and received a sentence of two months' forfeiture and two months' confinement. The soldier found drunk in his uniform fared correspondingly. It did not take long for the idea to permeate that the order was cast-iron and meant to be enforced. I do

not say that soldiers did not go into the red-light districts. I do say that it soon became an exceedingly rare thing for one to go there in uniform, and the uniform was spared the corresponding odium.

Many of our recruits are farmers' lads who have left home for the first time. Desire to travel and to see the world brings many a young man into the Army. Homesickness, sometimes of a severe type, is not an unusual experience of this class. When I was on duty at Columbus Barracks Depot, I was surprised to see the number of recruits who became homesick a few weeks after their enlistment. Many would go absent without leave for the purpose of a few days' visit back at the old home. Their explanation generally was that they "just couldn't stand it any longer." They would come back and take their punishment. The young soldier joining his company for the first time is very likely to suffer from homesickness in an acute form. He should be told that in all armies homesickness is a prevalent disease; that the strong man grits his teeth and overcomes it—only the weakling gives up and violates his oath.

In my judgment, a company commander can do no better thing than to advise his men to make regular deposits with the paymaster. This is a good thing for the man and a still better thing for the company. It gives a company commander a grip on his men that is quite helpful. Whenever I have found an organization of unusual excellence, I have noted that as a rule, the descriptive lists showed a large percentage of men with deposits to their credit.

The young soldier joining an organization for the first time is at a formative period of his life. Influences of example at that stage are powerful—evil influences just as powerful as good ones. The young soldier should be cautioned about his companions and warned that he will be judged by the company he keeps. In this connection, it is a good time to warn him about his manners. It does not shock me to hear a soldier or anyone else swear an ordinary oath. But I have never reached a stage where I have not been disgusted at some of the coarse, dirty language that many soldiers habitually use. I have at times heard men, unchecked, use disgustingly dirty, vulgar phrases in the presence and in the hearing of their officers. It will occur to every one just what class of words I have in mind, for they are not unusual.

I think we owe it to ourselves and to the service to put an end to that kind of language—language that would bring a touch of shame to the cheeks of any decent woman. The officer who would like to see it stopped, and yet does nothing, is inefficient. And it would be so easy to eliminate that kind of language from the barracks, the mess room, and elsewhere—nothing more is needed than to lay down the law to the noncommissioned officers; post a notice on the company bulletin board that disgustingly vulgar, dirty language will not be tolerated; a few tours of kitchen police to first offenders, and the deed is done.

And speaking of the manners of men leads me to remark what a wide difference there is between companies. Drop in casually at the supper hour in one company, and you will find the men at supper all in proper uniform. The captain thinks it is not demanding too much of his men to require them to present a decent appearance while at their meals. Drop in at the next company, and you may find the men straggling in barefoot, in undershirt, denim trousers, or any

other old thing that comes handy, looking for all the world like a lot of cowboys at a "chuck-wagon" dinner. One company will have vines, flowers, and a nicely tended grass plot; another will have nothing about the barracks that was not put there by the quartermaster. Whenever there is nothing at all attractive about the barracks, only the bare walls and a gravel walk, it is not likely that men will spend much time there.

There is no better time to show to the recruit "the other side of the picture" than when he first joins his permanent company—and there is no better man to show it to him than his captain, who will be his best official friend in the Army. That is the proper time to let him know that the soldier's life is not one continuous dream of bliss. Let him know that mixed in with its attractive features, there is much hard work connected with the soldier's life—that food must be cooked, floors scrubbed, windows washed, potatoes peeled, and other odd jobs of hard work done from time to time.

It is better that the young soldier know all of these things at the start. All the while, it should be drilled into him that the young soldier who tries to succeed does his part willingly and cheerfully, and that it is only the discontented weakling who is not man enough to stand up to his oath—only the weakling who quits and becomes the deserter false to his oath and false to his country.

VI.

Changed Conditions of Service.

I cannot close this paper without reference to some of the handicaps and the difficulties under which our officers now labor in the handling of their men—difficulties already great, which, be it said with sorrow, show no signs of decreasing.

In the first place, as it seems to me, times and standards have changed, and not always for the better. Time was when the notably efficient officer with troops was greatly respected and was regarded as justly entitled to sit in the front row.

This was so from the very nature of the case; thirty years ago, duty with troops was about all there was to American military service. There was no general staff, no detailed staff, and comparatively few on detached service. Other considerations now dominate the situation. In the change that has taken place, efficiency with troops (the most important thing of all) has somehow gotten lost in the shuffle. Unless an officer has made a reputation as a student, as a writer, as an attaché or aide, or in some special line of work, it is not unlikely that his light will continue to burn unobserved.

I do not decry the work of the student—we need more, not less, study on the part of our officers. Our service schools have done, and are doing, an excellent work. Any officer who belittles the importance of theoretical knowledge is behind the times. All that I declaim against is the tendency to believe that the actual value of officers can be sufficiently determined by classroom standards. Some of those who are stars on paper work do not shine so brightly when it comes to getting best results out of men.

If America were at war to-day, and we could bring back to vigorous life such soldiers as Grant, Sherman, Sheridan, Thomas, Lee, and Jackson, they would still be marked men. There are many changes and many things of which they would be wholly in ignorance, but they

would all be notable because they were leaders of men.

I have heretofore made mention of General McArthur's company—an organization in which the sense of company pride was so strong that it seemed to ooze from every pore. But let it be remembered that conditions then were far different from those of to-day. At that time there were companies which had been commanded by the same captain for years; a change in the list of sergeants was an event. The foreign-service roster for officers and noncommissioned officers was not then in existence. There were no excessive demands for detached service of one kind or another.

More than that, the esprit of regiments was at a point which our younger officers, accustomed to present-day conditions, can scarcely comprehend. At that time there was in existence the old system of regimental promotion, a system which, whatever its disadvantages in the way of unequal promotion, was the best of all systems for creating and maintaining the esprit of regiments. The colonel knew his officers, and the officers knew their men.

I come now to that greatest of all handicaps in the successful management of men—the colonial regiment. There must be good reasons for the colonial regiment, or it would never have been inaugurated. At the same time, it may justly be claimed that the whole system was new to our service. The wisest man cannot foretell the results of experiments. That there are grave disadvantages connected with the scheme of colonial regiments is a fact patent to all who have had opportunity to obtain first-hand knowledge. Some time ago, I asked an officer who had been for months on duty with troops to prepare for me a statement of the practical workings of the system. His statement was written with especial reference to the results that followed when several regiments were brought from the United States to replace an equal number serving in the Islands. It sets forth the actual conditions better than anything else I have seen:

"It is important that the rider know his horse; it is of infinitely greater importance that superior and inferior know each other, for without such knowledge, there is lacking that spirit of kindliness, sympathy, and mutual help so essential to the administration of exact justice, the very basis of true discipline. From these conditions there results a lack of confidence, proper coordination becomes impossible; needless friction is engendered, and discipline suffers. . . . These conditions are greatly accentuated in this regiment at the present time. . . .

"The officers knew not the men, and the noncommissioned officers were strangers to both. This regiment so composed is not a homogeneous body, but a conglomeration of several regimental families with differing traditions—a condition that makes for discord rather than harmony. My experience as a summary-court officer under these conditions has been that in respect to other offenses, an *excessive* proportion of the cases tried by me have been for insubordination towards noncommissioned officers, and I am clearly of the opinion (from the nature of the evidence given) that most of such cases would not have arisen had the men and the noncommissioned officers known each other better and exercised towards each other the tolerance and patience they would have shown had they better knowledge of each other, and felt them-

selves to be (as would have been the case in more permanent organizations) members of one large family.

"A regiment with at least one stable and permanent element can preserve some measure of its traditions, but when it is constantly changing, and changes from colonel to private every two years—it ceases to have an identity; it becomes simply a number. The value of a good name and pride of ancestry are as potent for good in organizations as they are in individuals, and every reasonable effort should be made towards their preservation."

I cannot state the case any stronger than is done in the foregoing. It is difficult for any officer to do his best work in a colonial regiment where he is a stranger to everyone, and everyone is a stranger to him. Let us not lose sight of the fact that it takes something more than a specified number of officers and men to make a real company or a real regiment. There is too much of the feeling that the man assigned to a colonial regiment is serving a two years' sentence. No regiment, as a regiment, can prosper under any such sentiment. Equalization of foreign service is an excellent thing; but it is a high price to pay, if it is bought at cost of a proper esprit.

With the present system of a constantly changing personnel—from colonel to private every two years—our officers on duty with troops are entitled to greatest credit for the loyalty and the high sense of duty they evince in their service under these difficult conditions.

The Army is soon to receive a large increase. Let us hope that increased strength will make possible the re-establishment of permanent units. If at the same time, something can be done to create and maintain a better esprit, a useful work will have been accomplished.

Hand Grenades

From Various Sources

MODERN HAND GRENADES *

THE use of hand grenades as an implement of war dates back many centuries. History records their use as far back as 1536 at the siege of Arles. Up to the close of the 18th century, soldiers were trained in the throwing of hand grenades. They were for that reason called grenadiers. The grenades were hollow balls of iron or other metal about two and a half inches in diameter, filled with powder and provided with a fuze, which was lighted before being thrown. Soldiers of long service and of marked courage were selected as grenadiers. At first, there were a few in each regiment; later entire companies were formed; and still later every infantry battalion had its own grenadier company, which in the different armies had precedence over the other companies at parades and similar formations. This continued to be the case

*The above article was written before the war. Since the hand grenade is now an important weapon in trench warfare and close-range fighting, the statements concerning the various kinds of hand grenades will certainly be of great interest.—The *Militär-Wochenblatt*, September 11, 1915. Translated for the INFANTRY JOURNAL.

long after the grenadiers had ceased to carry the grenades which had originally given them their name; their distinguishing characteristic became their great height and their peculiar headdress (grenadier caps).

During the war between Russia and Japan, hand grenades were again used in great quantities by both sides, especially in fighting at close quarters and in assaults on the different forts about Port Arthur. Those of the Japanese were in the shape of a small thin cylinder about 8 inches long and 3 inches thick, which were filled with explosives and had a safety fuse in the cover. If the fuse was lighted before throwing, the grenade would have about nine seconds to reach its destination before exploding. It did not, however, burn long enough to make it possible for the enemy to pick it up and throw it away before it could do any damage.

In a general way, these grenades and their use indicate a return to former types. Any conserve can, filled with powder or dynamite and provided with a fuse, could accomplish about the same damage.

Nevertheless, the effect of these hand grenades, especially in an enclosed space, was very great. For example, on one occasion, a guard of 17 men in the guard room were killed by the explosion of an improvised grenade of this type, which consisted of a piece of gun cotton provided with a fuse and which was thrown into the room through a window.

As the effect of the grenades is great, especially when they are used under favorable conditions, for example in the hands of an assaulting column or a sortie detachment, the Japanese employed special protective nets, which consisted of wooden frames covered with strong wire netting from 120 to 210 cm. high, when working on fortifications at close range from the enemy.

If hand grenades attained so satisfactory an effect in an improvised form, it is not surprising that the inventor's mind occupied itself with this means of combat, and has endeavored to adapt it to the requirements of modern warfare.

First of all, it was very important to invent a projectile that would unite deadly effectiveness with complete safety of the thrower. Mr. Aasen, the Danish inventor, constructed a number of hand, rifle, and mine grenades which are said to fulfill these requirements. The hand grenades are carried by the man until required and then thrown by hand. The rifle or "howitzer" grenades are fired from a firm rest such as a wooden stand made from a rifle placed on the ground and directed at various angles of elevation by means of stakes. The mine grenade is anchored in the ground and discharged by electricity upon approach of the enemy.

The following report is made of the tests which the inventor held with his grenades on his private proving ground in Copenhagen:

Seven men behind cover fired volleys at a group of 80 wooden, double silhouettes, distributed over a space of 900 square meters under cover. From the first volley, 93 hits were made on 43 silhouettes. After the third volley, 72 targets showed 168 hits. The distance was between 300 and 400 meters.

The rifle grenade weighs about 550 grams. It contains 72 bullets weighing 2.5 grams and 72 grams of explosives. The 72 bullets cover a space of at least 40 to 50 square meters. The rifle grenade may be fired from an ordinary army rifle at any range up to about 400 meters. The great destructive effect of the grenade is due to the fact that the explosion

takes place immediately after the grenade strikes the ground before it has had time to bury itself in the soil.

The "howitzer" grenade weighs 1 kilogram and contains 215 bullets and a bursting charge weighing 200 grams. It can be thrown with the hand 40 meters or with a "howitzer" 300 meters. The "howitzer" is a contrivance made of a cylinder and weighs 12 kilograms. It may be carried like a rifle. The bullets of this grenade cover a semi-circular space of at least 80 square meters and spread only to the front and laterally, but not to the rear toward the thrower. They are, therefore, of especial value for fighting at close quarters. They are so constructed that they may be exploded only after they have traveled 8 meters toward the target.

Tests with this kind of grenades had the following results:

Volleys were fired from seven "howitzers" at a group of 80 figures distributed over a space of 900 square meters at distances of 280 to 310 meters. After the fourth volley, 68 figures were hit 143 times.

The hand grenade weighs 1 kilogram and contains 190 bullets weighing 2.4 grams and a bursting charge weighing 110 grams. In contrast to the above-described "howitzer" grenade, the bullets fly in every direction, so that it is only adapted for throwing from cover. A volley of seven grenades, thrown by hand from cover, made 119 hits on 33 figures against the target already described.

The last kind of these grenades is the mine grenade. It weighs about 4 kilograms and contains 400 3.3-gram bullets and a 200-gram bursting charge. The 400 bullets will cover a space of at least 800 square meters. These grenades together with their electrical connections are placed about one-half meter under the surface of the ground, so that they are completely invisible to the enemy. When it is set off, the grenade rises about three-fourths of a meter above the ground, then explodes, and throws the bullets in all directions parallel with the ground. At a distance of 10 meters, the bullets will go through wood at least 100 mm. thick and retain deadly effectiveness for a distance of 50 meters. A detachment of one hundred men can lay a line of these mines over a front of 4000 meters in less than two hours.

In a test, three mine grenades were laid in the corners of a triangle whose legs were 30 meters long, among a group of 145 wooden double silhouettes that were scattered over a space of 2700 square meters. The grenades were set off electrically, one after the other. The result was that 120 silhouettes were hit 700 times.

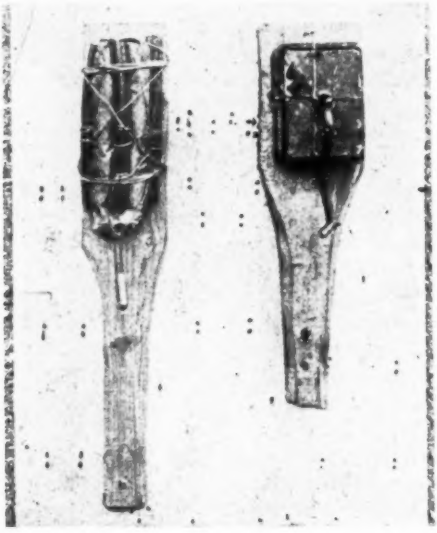
HAND PROJECTILES: GRENADES AND PETARDS[1]

The offensive by sapping has brought the French and German lines into contact. It has enabled us to harass the enemy and to compel him to keep his effectives complete and constantly on the alert. The offensive under ground has afforded the means of making breaches in the accessory defenses and is going to be a valuable auxiliary in the attempt to pierce the lines on the front chosen by the commander-in-chief for this general action.

At the short distance which at present separates the opposing trenches, an attack can be delivered with the least losses after preparation by intense ar-

[1] Translated from *L'Illustration*, May 22, 1915.

PADDLE PETARD, FRENCH AND GERMAN



In the French petard, the primer is inserted at the bottom, in the German petard, in the middle; the primer is ignited either automatically or by tinder.

tillery fire and by exploding mines prepared during periods of immobility and small attacks. To put the last defenders of the trenches attacked quickly out of action, part of the assaulting troops are provided with hand grenades or petards.

These missiles are thrown at the enemy over the barriers he may have erected and into the firing or connecting trenches, all parts of which it has not been possible to capture at once. They are also thrown at the defenders of the trenches when an obstacle of some kind (wire entanglements not destroyed, for example) prevents them from being occupied.

The hand grenade used by us is the bracelet grenade with automatic firing mechanism and consists of a ball of cast iron filled with an explosive and of a leather bracelet which is fastened to the wrist. To the bracelet is attached a piece of rope about 30 centimeters long having an iron hook at its end.

Just before the grenade is thrown, the hook is engaged in the ring of the roughened wire of the friction primer placed inside the fuse-plug which closes the cast-iron ball. When the grenade is thrown, the ring with the primer wire, held back by the hook of the bracelet, is wrenched off by a sudden movement of withdrawal of the wrist, and the fuse is fired. The explosion takes place four or five seconds later.

This grenade is supplied to the fighting zone ready for use. It is quite complicated. It can be thrown about 25 meters.

The German grenade is composite; it can be thrown by hand or fired from a rifle. As a hand missile, it is used at short distances, 15 to 20 meters. It is composed of a copper rod to the ex-

tremity of which is fixed a cast-iron cylinder, grooved to facilitate its breaking into small pieces at the moment of explosion. The explosive is placed inside this cylinder. A copper tube also containing some explosive is placed in the interior. It is surmounted by a complicated system for closing the

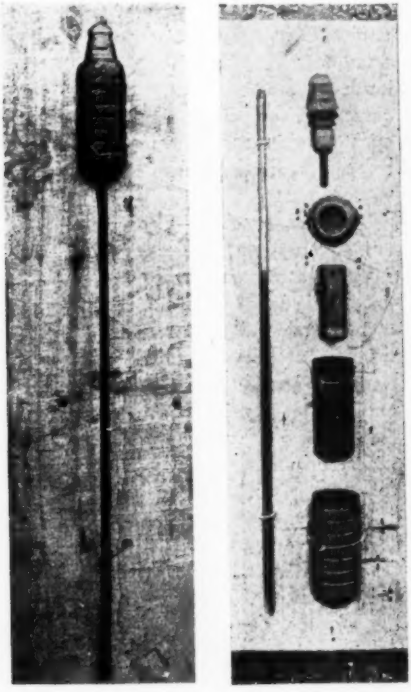
IMPROVISED GRENADES AND PETARDS.

This picture includes: a bracelet grenade; a primed French paddle petard; a primed English petard; a preserve can transformed into a grenade.

grenade and for automatic ignition by percussion, which results in at least 50 per cent of misfires.

Used with the rifle, this grenade has a maximum range of 400 meters. At the extremity opposite the grenade, the copper rod ends in a copper stem about 3 centimeters in length, movable about the axis of the rod. This stem is covered with a copper sleeve of slight thickness, which is attached to it only at the extremity fastened to the rod. The diameter of the exterior of the sleeve must be such that it can be pushed into the gun-barrel without

GERMAN RIFLE GRENADE.



On the left, a grenade ready to be inserted in the rifle; on the right a dismounted grenade.

pressure. To fire the grenade, a blank cartridge is placed in the chamber of the rifle; the quantity of powder left in the cartridge is regulated according to the distance at which the missile is to be thrown. At the moment of firing, the explosive gases penetrate between the sleeve and the stem, and

jam the sleeve against the grooves of the barrel. The sleeve and the stem, which is attached to it, take a movement of rotation in the grooves of the barrel, which ensures the direction of the missile and the maximum efficiency of the explosive gases of the cartridge.

The bracelet grenade and the German grenade just described have to be made in a factory. Attempts have been made to construct similar missiles with the explosives which are at hand at the front, cheddite and melinite. Several kinds have been made: a primed cartridge and a primed hand petard, fitted on a wooden paddle, a preserved-meat tin can (*boite à "singe"*) filled with explosive, etc.

The Germans have hand petards similar to ours with different explosives. These missiles are primed by a detonator and a slow match, and can be thrown about 30 meters. The discharge takes place either automatically or by tinder. They are made on the spot and very rapidly. The assaulting troops carry them in baskets, in haversacks, or strung on a circle of wire carried on the shoulder.

Grenades and petards constitute a terrible weapon. These projectiles exert considerable moral effect owing to the violence of their explosion and the awful wounds which they occasion, and they make it possible to reach the enemy at points where it is impossible to use the rifle and bayonet.

GRENADE WARFARE.

(Notes on the Training and Organization of Grenadiers.[1])

Preliminary Notes.

I. Subjects of Instruction.

Grenadier Instructors must be thoroughly conversant with the following Official Publications:

1. Manual of Field Engineering, Chap. XIV, Secs. 98–107.
2. Infantry Training. Appendix 1.
3. Musketry Regulations. Part 1, Appendix VII.
4. Instruction Guide to Grenades, 1915.

There is as yet, however, no official publication dealing with the practical training of grenadiers. It is the purpose of the following notes to suggest a simple scheme of training, avoiding the more intricate technical detail and concentrating mainly on the practical qualifications which an efficient grenadier must possess.

There are seven main subjects of training:

1. Explosives, detonators, fuzes, etc.
2. Improvised bombs.
3. Service grenades.
4. Grenade throwing.
5. Bayonet fighting.
6. Barricading.
7. Organization and tactics.

The first three are partly theoretical, and there is no need to teach more than a simple working knowledge of the subjects. Nos. 4, 5, 6, call for long and careful practice, and a high degree of skill. No. 7 should be made the final stage of training, and must not be attempted until an adequate standard in every other subject has been reached.

II. Materials and Equipment.

An adequate supply of service explosives and grenades is rarely available, but this is not an insuperable barrier to proper training. The following materials can be procured without much difficulty or expense, and

[1] Grenade Warfare. By Lieut. G. Dyson, London: Sifton, Praid & Co., Ltd., 1915.

with them, all the principal subjects of instruction can be effectively taught.

1. Dummy service grenades with the mechanism complete but unloaded.
2. A reasonable quantity of gun powder and safety fuze (commercial safety fuze will do).
3. Small quantities of service explosives, detonators, and fuzes can be obtained, or imitations made, sufficient to demonstrate the appearance of those most likely to be met with in service.
4. Spring-bayonet equipment.
5. A number of cast-iron shells similar in weight and size to Hand Grenade No. 5 (egg shape) for throwing practice (see below).
6. A number of wooden dummies similar to Hand Grenades Nos. 1 or 2 (see below).
7. Periscopes of any pattern.
8. Sandbags and digging tools.

The provision of a suitable training ground is most important. Throwing pitches with distances accurately and plainly marked must be provided, and a scheme of trenches must be designed and made, giving opportunities for throwing practices at varying distances, and containing traverses and communication trenches such as can be used in the various stages of training.

Clear indications of distance are essential. Only by this means can men be taught to judge distances accurately when observing or throwing.

Dummy Grenades Recommended for Throwing Practice.

1. Dummy "No. 1" (wood).
   Weight: about 1½ lbs. Length: 1 foot.
   Head: cylindrical. Length: 4 in.; Diameter: 2 in.
   Lead filling in centre to give required weight.
   Handle: 8 x ¾ in., with three canvas streamers attached to the base. Streamers 2 ft. x 2 in.
2. Dummy "No. 5" (iron).
   Hollow cast-iron shell ⅜ in. thick. Length: 3 in.; Diameter: 2 in.; Weight: about 1¼ lbs. Open at one end.
   This dummy can be used as a "live" bomb by inserting a small charge of gunpowder, properly enclosed and tamped with earth, with safety fuse attached. The charge should be so small as merely to drive the contents of the shell out of the open end. The shell suffers no damage and can be used repeatedly.

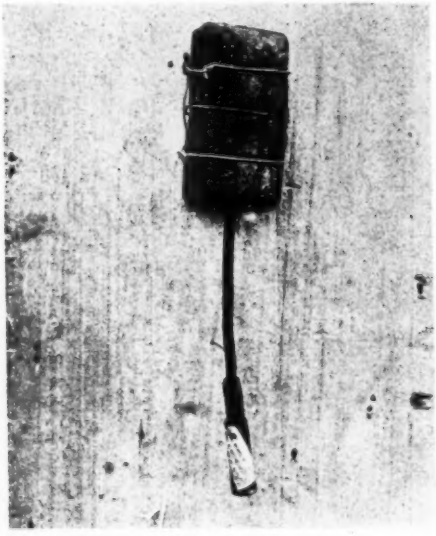
III. GENERAL RECOMMENDATIONS.

1. Practice in the manufacture and use of simple live bombs is essential, but instructors must take the greatest care to ensure that familiarity with explosives does not lead to carelessness in handling them. Adequate supervision must be insisted on at all times.
2. All field work must be practised under service conditions, *i. e.*, fully armed and equipped. Packs may be discarded, but in other respects men must wear full equipment.
   In the case of throwers, carriers, or other men who carry special apparatus, rifles must be slung. A suitable method is to sling the rifle, not across the back, but vertically from and behind the left shoulder. Hold the sling strap with the left hand and grip the rifle

with the left elbow to prevent it from swinging. In this position, the rifle will not appreciably hamper the thrower, and it can be slipped off for use at a moment's notice.

3. Squads under instruction must not be larger than the normal size of a grenadier party, *i.e.*, 6 to 12 men. Each man requires individual attention, and large parties make proper supervision impossible.
4. In all exercises, instructors must introduce elements of competition into the training. Scores must be kept of all throwing practices, and a rigid system of marks and disqualifications in bayonet work.
5. Grenadiers must be skilled in all branches of their work and ready to take any place in the party. Instructors should, however, note and encourage special aptitude on the part of any particular man and develop it to the full.
6. Instructors will further bear in mind that grenadier training for modern warfare must not be done on hard and fast lines. Experience is constantly modifying and adding to the means and objects of instruction. With regard to storming parties in particular, experience has proved the value of many forms of organization and tactics. Instructors will therefore amplify the various branches of training at their discretion, taking note of any developments of obvious value, and encouraging well-conceived initiative in their men.
7. Trench mortars and other mechanical bomb throwers can be described and demonstrated if they

ENGLISH PRIMED PETARD.



The priming is effected by the rotation of the paste-board cap placed at the end of the fuse which it covers and protects.

are available, but too much time must not be devoted to them, to the detriment of the more important subjects of training for hand grenadiers.

8. The time available for training should be divided approximately as follows:

Lectures and bomb making	15	per cent.
Throwing and observing	30	" "
Bayonet fighting	20	" "
Barricading	10	" "
Storming parties	25	" "

Such a time-table lays proper stress on the importance of developing a high degree of skill in the more essential practical exercises.

NOTES ON TRAINING AND ORGANIZATION.

I. SERVICE EXPLOSIVES, DETONATORS, AND FUZES.

Short, simple, lectures should be given, with demonstration, on the appearance, chief properties, and uses of the following:

Gunpowder;
Guncotton;
Detonators;
Safety and instantaneous fuzes.

Special emphasis should be laid on the following points:

Gunpowder.—The necessity for the proper enclosing and tamping of low explosives.

Guncotton.—The use of detonation with high explosives. All charges to be in close contact with each other and with the objectives.

Detonators.—The need for extreme care in handling and manipulating. Avoid friction, heat, and shock.

Fuzes.—Test the burning rate of safety fuze before use. Joints to be carefully made and secured with the cores in contact.

The nick joint to be used in preference to the scarf joint.

Fuzes and other special igniters not being always available, learn to light fuzes by placing a match head on the core of the fuze and striking the box on the match.

II. IMPROVISED BOMBS.

"Jam tin" bombs should be made and explained, using various charges according to the materials available.

"Hair Brush" bombs can be similarly demonstrated.

When instructors are satisfied that the men thoroughly understand the use of simple materials, they may allow the class to make simple low-power, time-fuze bombs individually.

The best introduction to this work is the use of small charges of gunpowder properly tamped. The powder must be enclosed in a bag, the safety fuze (service or commercial) tested before use and cut to give the desired interval before explosion. As the fuze has to be inserted in the charge, its length must be measured *outside* the bag *after* insertion.

A standard time of about four seconds should be adopted. This is the approximate standard used in the service time-fuze bombs, and men must become accustomed to it as soon as possible.

III. SERVICE GRENADES.

Service grenades, empty, for instructional purposes, must be obtained, and short lectures given on the main features of the mechanism. There is no need to insist on a knowledge of every interior detail. So long as the men

know how to prepare the grenades for throwing, and in case they are not thrown, to return the various safety devices to the safety position, that is all that is necessary. Men only require such familiarity with them as will ensure safe handling.

Remind the class constantly that the detonators are usually packed separately, either in another box or in a special compartment of the grenade box. The grenadier must therefore cultivate a habit of looking for the detonator in any bomb that may arrive new, and if it is not in the bomb, he must find and insert it before the bomb can be used.

Men should be examined individually in the preparation for throwing of various types of grenades.

IV. GRENADE THROWING.

This is a most important branch of grenadier training, and a very high standard of accuracy is required. Careful practice on sound lines is essential, and a considerable portion of the time available for training must be devoted to it. The difficulties are greatly augmented when, as is usually the case, throwing has to be done under complete cover and according to directions given verbally by an observer. It is impossible to exaggerate the importance of throwing practice of every kind. There can be no hope of success without it. Bad throwing not only means certain failure both in attack or defence, but it also subjects the grenadier party to the risk of heavy casualties through the clumsiness of its own throwers. Grenadiers must therefore be made to understand clearly at the beginning of their training that nothing can excuse inaccurate throwing, and instructors must not be satisfied until the thrower can, from behind cover and in obedience to the command of an observer, throw missiles of varying weight and size into a specified trench at any reasonable distance or in any direction. Training must be graduated to attain this end.

In all practices involving the use of cover, men must work in pairs, one directing and observing, the other throwing.

The training of the observer is of equal importance, and efficiency comes only after much practice. The observer must be able to give distance and direction quickly and accurately. He must not be allowed to be vague. Terms like "about" or "nearly" must be repressed. Moreover, he must not give negative information. If the thrower has missed the objective, the observer must not be allowed to describe what happened to the bad shot; he must give positive directions for the next.

For instance, if the shot has fallen a yard to the left of the objective, the observer must not say, "A yard too much to the left." He must direct the next shot and say, "Throw a yard to the right." The reason is obvious. Positive directions, even if only half heard, are of some use; negative directions are certain to be both confused and confusing.

Moreover, the observer must give his directions in the form of short, sharp, clear words of command. He must learn to *command* quickly and accurately, and the thrower must be instantly ready and able to *obey*.

The observer will also learn to use a periscope, and go through all the later practices by means of it.

With regard to methods of throwing,

no hard and fast rules can be laid down. Grenadiers have to throw from all kinds of positions over every kind of obstacle, and the method of throwing must therefore be constantly modified. One point should be insisted upon, viz.: a *high angle* of fire. The following method of throwing will encourage this, and all practices in the open should be done in this way:

(*For a right-handed thrower.*)

Turn to the right with the left shoulder pointing towards the objective. Extend the right arm away from the objective and throw by swinging the right arm upwards over the head (*overarm*).

When throwing in trenches, grenadiers must be constantly reminded of the great danger in swinging percussion grenades. A hit or graze on some part of the trench may easily be fatal to the thrower. No preliminary swinging will be allowed.

Instructors will keep written scores and encourage competition. Only those bombs which fall clean into the objective will be allowed to score.

When a sufficiently high standard of accuracy has been reached, low-power, time-fuze bombs can be used. Practice with live bombs is essential to accustom men to throwing them with the same coolness and accuracy as dummies. When using live bombs, the thrower will hold the bomb in his hand with the arm extended. The carrier, who will always be with him, will light the fuze, and as soon as it is lit, will tap the thrower's arm as a signal that the bomb is ready to throw, and the thrower will time his throw so that the bomb falls into the objective just before it explodes.

Table of Throwing Practices.

Practice—

1. Throwing in the open: (*a*) standing; (*b*) lying.
2. Throwing from trench to trench at marked distances up to 25 yards.
3. Throwing from bay to bay over one or two traverses.
4. Throwing from or to awkward or diagonal points.

The above to be practised with dummy "No. 1" and dummy "No. 5."

Practices 3 and 4 must be done with an observer who will give distance and direction.

Practice 4 to be repeated with live bombs.

V. BAYONET FIGHTING.

Bayonet fighting as taught in the service manuals requires some modification when applied to grenadier practice. Grenadiers will fight in enclosed and narrow spaces where shock tactics are rarely possible. Methods similar to those of a swordsman are required, with a perfect combination of eyes, hands, and feet. Practice must be chiefly designed to develop agility and speed at close quarters. Service-bayonet instruction will accustom the men to the weight and balance of the weapon, and will teach the points and parries. This must be supplemented by practice against a living opponent, and for this purpose, spring-bayonet equipment must be used, and a series of individual contests at close quarters arranged.

Pay particular attention to the following points:

(*a*) Eye on the opponent's point.
(*b*) Body well balanced.
(*c*) Point at the opponent's throat.
(*d*) Parry quickly but not too wide.

(*e*) Shorten arms at close quarters and use the jab.

(*f*) Use the butt, trip, etc.

Men must be frequently reminded to have their rifles loaded. Shooting is often possible and may be the best means of acting effectively in certain circumstances.

Instructors will adjudicate in all contests and preserve a rigid standard of scores and disqualifications. The most satisfactory system is to have two markers, one to each man. Each marker will note the number of touches his man receives, and score them to his opponent.

Table of Bayonet Practices With Spring-Bayonet Equipment.

Practice—

1. Contests in the open.
2. Contests in a straight trench.
3. Contests around corners or traverses involving the use of cover or surprise.

VI. BARRIER AND BARRICADE MAKING.

Grenadiers must be skilled in the rapid filling and handling of sandbags and must be able to construct quickly, with any available material, bullet-proof barriers. Instructors will indicate suitable positions, and train their men to block up a trench, using available cover and working against time. All practices will be arranged in competitive form.

Each man will be given the same number of empty bags. Men will work in pairs, and each pair will have the same number of tools. Instructors will see that the bags are properly tied up. In building with sandbags, the bags will be laid in alternate layers of headers and stretchers, and the structure will be made as solid as possible by careful fitting and packing. Solidity of structure should always be tested.

Table of Barricade Practices.

Practice—

1. Filling sandbags against time:
   (*a*) With the entrenching implement;
   (*b*) With pick and shovel.
2. Blocking a trench with sandbags.
3. Building a partial barrier, leaving a narrow open space sufficient for one man to squeeze through. This space must be on the right hand side facing the line of advance.

VII. ORGANIZATION AND TACTICS.

Grenadiers have special duties to perform, both in defence and attack, and their tactics and organization must be studied and practised with a definite objective in view. Instructors must introduce into this part of the training every possible element of reality, and must foster to the fullest extent individual initiative and skill.

The Defence.

Grenadiers are used defensively to prevent the approach of enemy saps and mines or enemy storming parties. Enemy counter attacks are usually best met by rifle fire, but grenadiers can often give valuable assistance at close quarters. Machine-gun emplacements within throwing distance should be made untenable, and a constant effort should be encouraged to develop and retain a clear superiority over the enemy in grenade throwing.

Accurate throwing and observing and arrangements for adequate supplies claim chief attention for these purposes. Success depends on the thoroughness of the preliminary training.

The Attack.

There are three phases of attack that grenadiers may have to carry out.

1. *Preparing for an assault on enemy trenches within throwing distance.*—Throwers must be suitably distributed in the line of trenches from which the assault is launched. Accurate throwing, properly observed and distributed, will greatly assist in preparing for a successful assault.
2. *Assisting and supporting the assault.*—Grenadiers will usually advance with the infantry supports, and will assist in destroying the enemy and securing the front and flanks of the attack when the enemy trenches are taken. This will usually lead to a further stage.
3. *The assault and capture of trenches on the flanks or communicating trenches in front by means of grenadier storming parties.*—An infantry assault, however well conducted, rarely succeeds in occupying immediately the whole of the enemy line of trenches. Casualties, loss of direction, or unexpected obstacles, frequently result in leaving "gaps" in the captured position. It is the particular duty of grenadiers to deal with these "gaps" as soon as possible, and for this purpose, an efficient and properly organized storming party must be instantly available. Grenadiers for this duty must be placed on the flanks of the attacking force.

The work and arrangement of a grenadier storming party requires very careful consideration and practice. Parties must necessarily vary in size and constitution, but practice is essential in some form that will enable men to understand their particular duties, and at the same time, accustom them to act for the advantage and cohesion of the whole.

The following notes describe an arrangement that has been used with success:

Grenadier Storming Party.

A party consists of 8 men as follows:

1. Bayonet man.
2. do.
3. Thrower.
4. Carrier.
5. Spare bayonet man.
6. Spare carrier.
7. Barricader.
8. do.

Bayonet men move in advance of the thrower. Their duty is to clear each section of trench as it is reached. When the thrower has thrown his bomb into the objective trench, the bayonet men must be ready to take instant advantage of the temporary demoralization of the enemy caused by the explosion and clear the way for a similar attack on the next section of trench.

The Thrower must be ready and able to throw a bomb at once wherever the bayonet man or other observer may direct. Accuracy is essential, and immediate readiness to obey.

Carriers are responsible for the supply of bombs and grenades. They must prepare them for throwing, and hand them to the thrower ready for throwing.

Barricaders must be furnished with sandbags and tools and be ready to go forward and block a trench at once.

GERMAN DISK HAND GRENADE

Disposition of party:

<..... Direction of advance

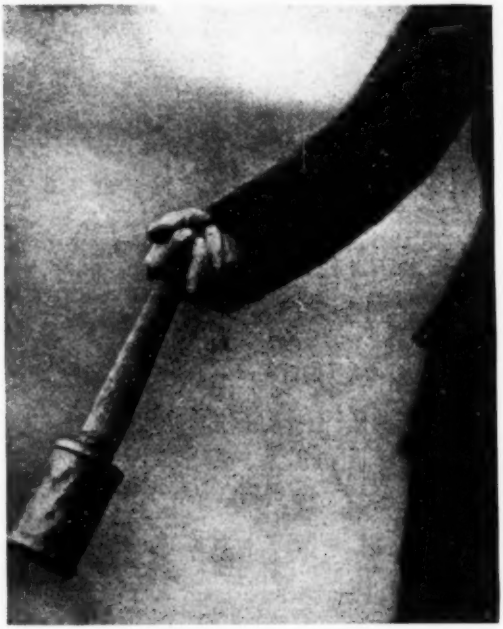
1—3—5—7—Grenadier—Main Body
2 4 6 8 Reserves of Infantry

The officer or noncommissioned officer in charge must place himself where he can best observe, replace casualties, and forward supplies. All men must be ready to exchange tasks at once in emergency.

It will be noticed that in the storming party itself, not more than two men are actually together. Instructors must see that these intervals are preserved. The distance should be such as to place one solid corner of earth between each two. In this way, casualties from enemy bombs are reduced to minimum, while at the same time the men are taught to work in pairs, and act with initiative. When the front pair moves forward, the rest follow, preserving their intervals. Men must be taught to maintain constant communication with the members of the party behind or before them. Practice is essential in sending clear messages down the line, so as to secure prompt reserves or supplies when necessary.

Arrangements to assist the progress of a storming party by covering or machine-gun fire by the main body are of the utmost value. Care must be taken, however, to have some simple form of signaling which will mark the progress of the party and give the main body an exact indication of the party's position. A cap raised on the bayonet at frequent intervals is a simple and successful method of doing this. Cov-

GERMAN "HANDLE" GRENADE



ering fire will greatly assist the storming party by preventing the enemy from observing, but there are obvious dangers if the position of the party is doubtful. Practice in this as in all other departments of the organization must be systematically enforced.

Storming parties must also learn to carry out their operations with as little noise as possible, even by day. Communication must be chiefly maintained by word of mouth, and consequently messages must be passed down the line in clear and unmistakable form, but unnecessary noise or shouting must be constantly repressed.

Parties will be organized similar in constitution to the above. Numbers may vary, but the general principles of disposition and attack will be preserved. The following practices will be carried out, at first with dummy bombs and later with live bombs.

On service, every grenadier will carry as many bombs or grenades as is possible or convenient, and will be ready to become "thrower" or "carrier" as required. The supply of grenades is a constant difficulty in attack, and must be carefully rehearsed.

Practice 1. *Storming a line of fire trenches from the flank.*—In this practice, communication or other branch trenches will be ignored. When more bombs are required, No. 6 will replace No. 4. No. 4 will go back to reserves and bring bombs or send a carrier to replace No. 6. No passing or exchanging bombs by hand

will be allowed. The men must change places and thus save time. When the party has reached its furthest point of advance, the barricaders will come forward and make a barrier in such a position that it is well in view from a corner some yards behind. The party will then retire, leaving 1 bayonet man as sentry at this corner. The barricaders will then make a partial barricade in a similar position still further back. The interval between the two barriers should be such that enemy bombs thrown by hand will fall within it. The sentry can protect himself by using his corner and can give timely warning if the first barricade is stormed. His position will enable him to shoot with effect, and if he is rushed, the second barrier will afford similar protection until a counter offensive is organized. The reserves and main body will meanwhile occupy and consolidate the ground gained.

Practice 2. As in practice 1, but including communication trenches.—When a communicating or other branch trench is encountered, the thrower will place a bomb in the first section of it. No. 1 will assault this section, and the thrower will throw into the second section, No. 1 assaulting it similarly and posting himself at the second corner. The rest of the storming party will remain in their former positions in the fire trench. No. 5 will take the place of No. 1 at the head of the party. Nos. 7 and 8 will be sent to block the communication trench at the end of the second section. This done, Nos. 7 and 8 will return to the party, and the original No. 1 will act as sentry at the corner between the two sections of communicating trench. The storming party will in the meantime proceed along the fire trench as before.

This method of dealing with a communication trench is only a temporary measure to allow the storming party to proceed along the main objective. A party from the reserve can then be organized to assault the communicating trench as far as may be necessary. This branch party will destroy the barricade and proceed as in Practice 1. All communication trenches as they occur will be dealt with in this way.

In the case of island traverses, the thrower will throw on both sides of the traverse, Nos. 1 and 2 each assaulting one side and meeting when the thrower has cleared the far side with a third bomb.

Practice 3. The whole grenadier company will charge a line of trenches in extended order, organize themselves, and advance on one or both flanks as in practice 2.

Throughout these practices instructors will impress on their men the extreme usefulness of throwing frequently into the next section of trench but one. This will render effective reply by the enemy very difficult.

Finally, instructors will remember that the chief requisites for success are dash and initiative in the bayonet men and skill and coolness in the thrower. Anything which conduces to the attainment of a high standard in these respects should be encouraged to the utmost.

VIII. NIGHT OPERATIONS.

Grenadiers may be required to perform at night any of the duties that are theirs by day. They should, in addition, be able to undertake a night reconnaissance. Instructors will appreci-

ate, however, that no useful purpose is served by night operations, unless the men have already reached such a high standard in their work by day that the risk of confusion or accident is reduced to a minimum. Men must be able to organize themselves quickly and silently. Throwers must be particularly efficient.

Training will be arranged in two forms:

1. *Grenadier Patrols.*

A detachment will occupy a line of trenches. They will be disposed as the officer or noncommissioned officer commanding them may direct. Listening posts or other advantageous points of observation which the ground may afford will be used, and it will be the duty of the detachment to report to its commander any movement or incident that may occur on its front.

The remainder of the party will be marched to a point some 200 to 300 yards in front of the above trenches. From this point grenadier patrols will be sent out to reconnoiter the line.

Patrols will be given a fixed period of time in which to accomplish their task and bring a report. Their duty will be to approach, noiselessly and unseen, as close as possible and bring back information as to the length of line occupied, the numbers and disposition of the occupying troops, together with a description of the ground and of any listening or other advanced posts they may encounter. The following points are important:

(*a*) Patrols will be from two to four men.

(*b*) Patrols may remove their entire equipment, carrying only a haversack with a few bombs (dummy).

(*c*) These bombs are only to be used in extreme emergency. Patrols are sent out for information and observation, not for fighting.

(*d*) Patrols will move or crawl noiselessly and pay particular attention to background and all the other details of cover.

(*e*) If patrols suspect that they are observed, they must learn to "freeze" to the ground, lying absolutely motionless.

(*f*) In complete darkness, it is fatally easy for patrols to lose direction and for men to lose one another. Every device that will lessen these risks must be employed.

(*g*) Men may tie themselves lightly together, so that they need not proceed in a bunch. They will thus decrease the risk of discovery and at the same time retain connection with one another.

At the conclusion of this exercise, the commanders of the two parties will make separate reports, and the officer directing the whole operation will compare them and comment on them to the men concerned.

2. *Night Storming Parties.*

The practices detailed above for grenadier storming parties will be used (see page 304).

Two points call for attention:

(*a*) Parties must work quietly.

(*b*) Every effort must be made to deceive the enemy as to the exact direction of advance. Throwers and carriers (Nos. 3 and 4) may, if the darkness is sufficiently complete, emerge from the trench and crawl along on one or other flank of the advance. They must, however, keep in close touch with the bayonet men, and their throwing must be perfect.

Notes on Instruments*

The Rifle Sight.

The rifle sight is primarily an instrument for the determination of small vertical and horizontal angles for the purpose of directing the angles of departure of the bullet from the rifle so that its path may intersect the line of sight at the target.

Figure 9 shows diagrammatically the necessary parts of a rifle sight in elevation (a) and plan (b).

EF represents the axis of the bore of the rifle; *A* is the front fixed sight; *B* is the vertical leaf attached to a horizontal base which can be rotated about *D*. The slide *C* can be moved up and down on the leaf *B* and an aperture in *C* together with the top of the front sight *A* fixes the line of sight *H-A-TARGET*.

It is evident that the position of the aperture of slide *C* fixes the vertical angle *AGE* and that the degree of rotation of the whole rear sight about *D* fixes the horizontal angle *HAE*.

Without going into the theory of the trajectory, it may be stated that a bullet fired from a rifle behaves like a baseball thrown by a ball player. It is acted on by three forces: viz., the force of projection, the force of gravity, and the retarding influence of the air. Suppose a second baseman throws the ball to home plate; he may throw it easily and well up in the air or throw it hard and with a small vertical angle of departure. Similarly, if he fields the ball close to the pitcher and throws home with all his strength, the ball will apparently go on a straight line but really will have a slight downward curve, while if he fields the ball in center field and throws home with the same force the ball will go high in the air over second base.

In other words, with a variable velocity of projection (initial velocity), the less the velocity the greater the angle

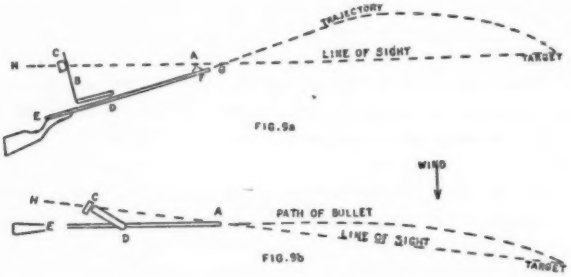


FIG. 9a

FIG. 9b

of departure *AGE* will have to be for a given distance covered, and with a constant velocity of projection, the less the angle of departure the less the distance traversed by the ball or bullet.

Now for rifle ammunition for a certain gun, the initial velocity is practically the same for every bullet. It follows then that there must be a certain vertical angle of departure corresponding to every range, if we assume the initial velocity to be constant. That is, if we are firing the rifle over a perfectly level surface and want the bullet to strike the ground, say 2000 yards away, we must tilt up the barrel so that it makes quite an angle (3 degrees, 14 minutes) with

* Prepared at the School of Musketry. Continued from September-October number of the Infantry Journal.

the ground. If we want the bullet to strike 1000 yards away, the upward tilt of the muzzle need only be 48.2 minutes.

Now it has already been shown that the sights form an instrument for measuring small vertical angles. If we adjust the slide *C* (Fig. 9a) so that the angle *AGE* has a value of 3 degrees, 14 minutes, we may put a mark there and label it 2000 yards. Similarly, if the angle *AGE* is made 48 minutes by adjustment of the slide *C*, we may put a mark there and label it 1000 yards. The whole of the graduation of the rear-sight leaf may be mathematically calculated in this way if we know the initial velocity of the bullet and certain facts about its weight and shape. The rear-sight leaf, so graduated, is said to be calibrated in yards (or meters) of range.

If we have a rifle with such a rear sight calibrated in yards of range and have the ammunition for which this calibration was made and wish to strike an object, say 1000 yards distant, it is merely necessary, theoretically, to set the sight at the 1000 yard graduation, get the distant object in line with the front sight and aperture of the rear sight, and fire. The bullet will leave the rifle on an upward slope, curve gradually to the horizontal and then downward, finally crossing the line of sight at the range desired (see Fig. 9a).

The horizontal angle *HAE* (see Fig. 9b) is set off on our sight in windage. It is measured in "points" instead of degrees, minutes, and seconds. If the sight is set over one point or division on the horizontal scale, the effect will be to make the angle *HAE* such that the line of sight will be 4.311 inches horizontally from the line of fire of the rifle at a distance of 100 yards, or 43.11 inches at a distance of 1000 yards, being in the same proportion at any other distance. It is thus a scale of the same general type as the mil scale, the value of one point of windage being 1⅙ mils approximately.

Mechanical Construction of Military Rifle Sights.

As has already been explained, the rifle is pointed in azimuth and elevation by means of a fixed front sight and an adjustable rear sight. Among modern firearms, this is practically the universal method, the only variation being in the auxiliary long-range sight of the British Lee-Enfield, which has a fixed rear sight and an adjustable front sight.

The front sight of military rifles may be dismissed with a few words. It is permanently attached to the top of the barrel near the muzzle and is, as viewed through the rear sight, an inverted V, either sharp or blunted or is rectangular in section. The width of the latter type varies from .05 to .08 inch. The front sight usually projects about .25 inch above the sight base, and the line of sight is invariably tangent to the top of the front sight.

The distance between front and rear sights (sight radius) varies from 19.4 inches (British Lee-Enfield) to 27.3 inches (Italian Mannlicher and Japanese Arisaka). On our service rifle, the sight radius is 22.125 inches for sight leaf and 21.54 inches for the battle sight.

Rear sights on military rifles fall into two general classes and a combination of the two.

The sight on our rifle is typical of Class 1, having a vertical leaf, graduated in yards, with a slide, movable up and down on it and capable of being locked in any position. A sighting notch or hole is a part of the slide and serves,

in conjunction with the top of the front sight, to fix the line of sight for the corresponding range graduation on the leaf.

In Class 2, the bar bearing the sight notch is hinged, generally at the end toward the muzzle, and can be set at a variable vertical angle with the line of fire. For short ranges it lies practically parallel to the line of fire, but at 2000 yards it may make an angle of 45 degrees or more with this line. The sight radius of this type of sight varies with the range. Its one advantage seems to be that by properly proportioning the cam on the base or leaf, the graduations can be made equal in size, irrespective of the range. It will be noted that the sight graduations on the leaf in Class 1 vary in size, being very small for close ranges and largest for the longest range. The German Mauser and British Lee-Enfield have sights which are typical of Class 2.

The French Lebel has a sight with a leaf which stands vertical and a slide which moves up and down on it for all ranges from 900 to 2400 meters. Between these ranges the sight falls into Class 1. But for ranges between 400 and 800 meters, the sight leaf lies practically flat, and the slide rests on one of a series of five shallow steps on the sight base. These steps are so calculated that the elevation of the rifle is correct for the range (in meters), marked on each step. There is no way to set for intermediate distances less than 100 meters when using these steps, and when they are used, the rifle is sighted for a certain zone instead of a certain range. At shorter ranges, then, this sight operates on the general principle of the sights of Class 2. The Belgian Mauser also has a sight of this combination type. The battle sight on our rifle may be regarded as a sight for zone fire since it is designed for one fixed sight setting.

The British sight and our own are the only ones provided with windage adjustment or means for directing the line of sight at a known and variable horizontal angle to the line of fire.

Windage adjustment is demanded by individuals who specialize in target shooting and is an absolute necessity for them, as the records of international competitions will show. As applied to our sight, the device adds little to the complication of the sight, and while windage will rarely be used in service firing by masses of men, it has a real value for expert individuals called upon to fire at a specific target. Intelligent use of the windage scale permits of the use of auxiliary aiming points when such can be found close to the real target in azimuth.

All rifle bullets have a decided drift to the right when the rifling gives a clockwise twist to the bullet from the viewpoint of the firer, or to the left when the rifling gives a counter clockwise twist to the bullet. This drift is small at the short ranges, but with our bullet, it becomes 13 inches at 1000 yards and 12 feet at 2000 yards. It is absolutely uncorrected by the sights of all rifles but our own. Our rear sight has an undercut in which the slide moves, and this undercut is so curved as to give a lateral movement of the notch or peep to the left as the elevation is increased. This lateral movement to the left corrects for all drift up to 600 yards and for roughly half the drift at other ranges beyond 700 yards and up to the limit of the sight graduations of the leaf.

The actual line of sight is fixed by four different shapes of apertures in all military rear sights.

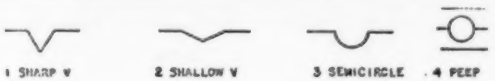


FIG. 10

Referring to Fig. 10, the Belgian, German, Italian and Spanish rifles have the sharp V; the Japanese rifle has the shallow V; the British, French and our rifles have the semi-circle; the British auxiliary long-range sight and our sight are equipped with the peep. Experiments show that a shallow semi-ellipse makes the best open rear-sight aperture. Except for the fact that the field of view is blocked, the peep sight is superior to all open sights, because when it is used, the firer need concentrate his attention only on the front sight and target. The peep aperture is smaller than the pupil of the eye, so that, if the front sight and target can be seen at all through the aperture, the line of sight is determined with sufficient accuracy. The eye, in order to get maximum illumination and definition through a peep sight, naturally and unconsciously centers the line of sight in the aperture.

In our service rifle, when the sight leaf is laid flat, the rear-sight notch on the slide is in position to be used. There is no way to change the elevation of this sight. It is fixed and constant, whatever the position of the slide on the sight leaf before it was laid flat. This sight is known as the "Battle Sight."

When used, it is supposed to give an elevation corresponding to a range of about 550 yards, and the idea is that when the rifle is fired from the prone position at an object 12 inches from the ground at 550 yards, there will be a continuous danger space from the rifle to a point 40 yards in rear of the target. Figure 11 shows the height of the trajectory (path of bullet) above the line of sight and ground under these conditions, and it will readily be seen that the space of 590 yards is a "danger space" for a standing figure at any distance up to 590 yards and for a kneeling or prone figure over a good part of this distance. Tests have shown that through some peculiarity of this sight (probably the shine on the slide in which the rear sight notch is cut), there is a decided tendency to take a fine sight which makes the corresponding range about 400 yards instead of 550 yards.

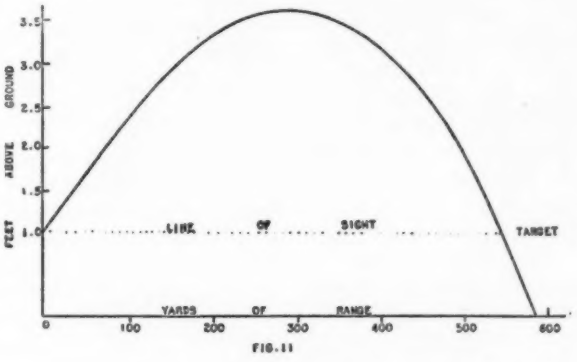


FIG. 11

Most foreign rifles have a minimum sight setting of 400 to 600 meters, and so may be said to use the equivalent of our battle sight for all the shorter ranges.

It is obvious that when using the battle sight, the firer must hold high for any range over 550 yards, must hold on for 550 yards, and must hold low for everything under 550 yards. The lowest holding is required at 300 yards when a firer must aim 2.6 feet below the point he wishes to hit. This low holding at short ranges must be impressed on all men using the battle sight.

Care of Sights and Precautions in Their Use.

The rifle sight is an accurate instrument and must receive proper care and be correctly used.

The sights, front and rear, should be cared for like any other measuring instrument. They should be guarded against mechanical damage and should be kept clean and free from sand and grit; moving parts should work freely and smoothly, being lightly oiled from time to time. For most satisfactory operation, the front sight and apertures of the rear sight should never be allowed to become bright or polished, but they should remain dull or even smoked, although the smoking of sights is not practicable in field service.

Before firing, the sight should be carefully examined, to be sure that the exact sight elevation and windage have been set off and the slide locking screw should be tightened so the slide will not loosen and slip under the shock of firing. There are three open-sight notches and a peep sight on the rear-sight slide, and particular care must be taken to use, as an index in setting the sight, the horizontal line passing through the aperture or notch which is to be used in aiming. Thus if a man uses the line through the peep sight as his index and sets this line at 600 with the idea of hitting the target 600 yards distant and then, through inadvertence, uses the open sight above the peep to aim at the target, he will really be using the sight setting 975, which falls opposite the index line through the open sight. As a result, he will fire far over the target, as he is really using a sight setting of 975 while aiming at a target 600 yards distant.

TELESCOPIC SIGHTS.

A telescopic sight consists of a telescope fitted with cross-hairs to define its optical axis and some means of varying the vertical and horizontal angles between its optical axis and the axis of the bore of the gun.

Telescopic sights are usually detachable from the rifle and are intended to be used by trained men under special circumstances. In use, the range and deflection (windage) is set off by means of rotating dials or other devices, and the rifle is then aimed by looking through the telescope and bringing the target exactly at the intersection of the cross-hairs.

Telescopic sights furnished by the Ordnance Departments are fully described in the pamphlets which are always furnished with them.

Care and Preservation.

Telescopic sights are necessarily delicate instruments and must not be subjected to rough usage, jars, or strains. When not in use, the telescopic sight should be kept in its case and stored in a dry place. It should be occasionally examined to insure its not being corroded, and all traces of dust or mois-

ture should be removed before being put away. To obtain satisfactory vision, the glasses should be kept perfectly clean and dry. In case moisture collects on the glasses, place the telescope in a gentle warmth; this is usually sufficient to remove it. A piece of chamois skin or a clean linen handkerchief will answer for cleaning purposes, care being taken that the cleaning material does not contain any dirt or grit. These sights are carefully adjusted before issue, and their adjustment proven by actual firings. The prism holder should never be opened except by a competent person. Before incasing the prisms at the factory, the interior of the body is thoroughly cleaned, and all particles of dust removed. If any fine particles should be left in the body, or if the body should be opened and particles enter, they will settle upon the reticule, and when magnified by the eye lens, obscure the vision.

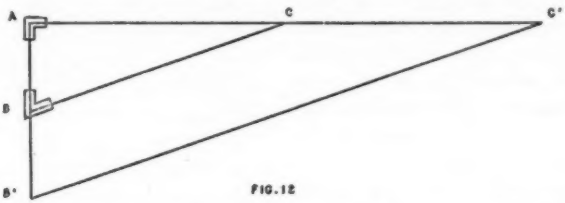


FIG. 12

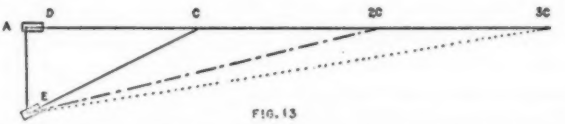


FIG. 13

RANGE FINDERS.

General Principles.

If in any triangle, we know the value of two of the angles and the length of one side, we can then determine the value of the other angle and the length of the other two sides. Range finders utilize this principle of trigonometry.

Case 1 (see Fig. 12). Suppose we have an apparatus by which we can lay off on the ground a right angle CAB and another angle CBA of a constant value such that $CA=3AB$. We wish to know the distance of a point C from the position of the observer at A. With the angle-measuring instrument, a right angle is laid off at A in the direction BB' and marked. A mark is left at A. The observer then proceeds along the line ABB' until, at a point B, he finds that his other constant angle just fits on to the points A and C. He then measures the distance AB with a tape, and $3\times AB=AC$. Similarly, if the distance to the point C' were desired, the observer would have to proceed to a point B' before his constant angle would fit on to the points A and C', and again $3\times AB'=AC'$. This is the principle of range finders with constant base angles and a variable base, of which the Weldon is a type.

Case 2 (see Fig. 13). Suppose we have a base AB of fixed length and at A we have a line of sight AD permanently fixed at right angles to AB. At B, we have a line of sight BE which can be rotated on B and make a variable angle with AB. Some means of measuring this variable angle ABE being provided, we may so calibrate the scale

that when both lines of sight point to *C*, the scale reads the distance *CA;* when both lines of sight point to *2C*, the scale reads the distance *2CA*, and when they point at *3C*, the scale reads *3CA*. Note that the angles increase by a smaller quantity each time although the distances are increased by equal increments. This is the principle of range finders with fixed base and one variable base angle, of which the Goertz, Hahn, Zeiss, and Barr and Stroud are types. In these range finders, the base *AB* varies in length from 60 cm. (about 2 feet) to 5 meters (about 16 feet). Optical problems prevent the use of a shorter base, and constructional difficulties make a longer base undesirable.

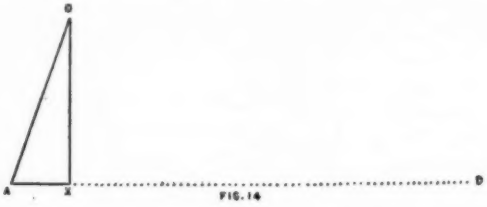


FIG. 14

The base being so short, the variable angle *ABC* must approach its limit, 90°, even for measurement of short ranges, so that a remarkable expedient must be adopted to measure the small changes in the value of this angle as the range varies. The optical and mechanical construction of fixed-base portable range finders will be taken up later.

The Weldon Range Finder.

The Weldon Range Finder comprises a device for laying out two base angles of constant value. The length of the base is then a certain fraction of the range.

The principle of the Weldon range finder has already been explained (Case 1). The instrument itself comprises three prisms mounted in a metal frame, which also has a compass and level attached. A steel tape (60 feet for infantry) is furnished with the range finder in order to measure the base after its ends have been fixed by use of the prisms.

The top or first prism reflects at an angle of 90°; the second at an angle of 88° 51′ 15″; and the third or bottom prism reflects at an angle of 74° 53′ 15″. These angles are so chosen that when the first and second prisms are used to fix the angles *A* and *B* respectively (see Fig. 12), the range *AC* is 50 times the base *AB;* when the second and third prisms are used to fix the angles *A* and *B* respectively, the range *AC* is equal to 4 times the base *AB;* when the second prism alone is used to fix the angles *A* and *B* (equal in this case), the range *AC* is equal to 25 times the base *AB*.

There are a number of ways of using the Weldon range finder, which are discussed in the pamphlet furnished with it. The commonest and most satisfactory method is the following:

The observer at *A* (Fig. 14) marks his position, and using the *second prism*, reflects the target *O* on some distant point *D*. Then selecting some intermediate object in line to assist him in marching straight, he moves toward *D*, halting occasionally to observe with the *first prism*, and makes sure he has not overshot the point where, as at *X*, the target *O* is reflected or aligned on *D*.

When he has found X, he measures the distance from X to A, and 5 OAX equals the range XO.

The Fixed-Base Range Finder.

This type of range finder comprises a base of fixed length with a line of sight at right angles thereto at one end, and at the other end, a line of sight whose angle can be varied. Some means of measuring the value of the variable angle in terms of the range is provided; the range is then directly read from this scale when both lines of sight point to the distant target.

Advantages.

The more important advantages of the fixed-base type of instruments are as follows:

Only one observer is required;

The ranges of moving objects can be continuously observed;

The accuracy of the determination is independent of the bearing of the object;

In the case of the smaller types, the range finder can be set in any position—horizontal, inclined, or vertical—to suit the nature of the object;

In general there are also the further advantages of greater convenience, simplicity, and rapidity of operation.

Essential Parts.

A fixed-base range finder may be regarded as consisting of two separate telescopes mounted in a common frame with the two objectives, situated one at each end of the frame, and with the eye-pieces at the center, suitable reflectors being provided at the objectives to direct the beams of light along the frame towards the eye-pieces, and the whole arrangement being such that the combined telescopes may be simultaneously directed on the same target.

The range finder itself forms the base of a triangle having its vertex at the object, the range of which is determined by measuring the parallax.

Types of Fixed-Base Range Finders.

For actually effecting the measurement of the angle subtended by the range-finder base at the target, there are available many methods, of which several are described below:

1. The two telescopes may be optically distinct from one another, each telescope being provided with its own eye-piece and cross-wire. In such a case, the range finder is so directed that the image of the target falls upon the cross-wire of one telescope, and then the image of the target is made to coincide with the cross-wire of the second telescope by some optical or mechanical device, which thus provides a measure of the range.

2. The eye-pieces of the two telescopes may be so placed that the right eye can observe one of the pictures and the left eye the other. In this case, it is possible to employ the stereoscopic principle first suggested for range finding by Helmholtz and developed by De Grousilliers in 1893. It is customary to substitute a mark for the cross-wire in the field of view of each telescope, and the operation of finding the range consists in making the mark and the target appear at the same distance, a suitable device being provided for the purpose.

3. In stereoscopic comparison, it is possible to dispense with all movable parts by providing a series of marks A, B, C, in one field and a corresponding series a, b, c, in another field; the pairs of marks Aa, Bb, Cc, being so disposed that Aa, seen stereoscopically together, appear to represent a single mark at, say, 1000 yards, Bb one at 1100 yards, and so on.

The observer then sees in the field of view a series of marks which appear to lie at regular intervals between the near and distant portions of the landscape. By observing the image of the target stereoscopically, its position with reference to the index marks in the field can be determined; thus, for example, the object may appear to lie between the two marks, 1000 and 1100 meters, and a rough guess may then be made as to its value between these limits.

4. The two images of the target obtained from the two ends of the base may be brought to one eye-piece, say, the right. These images may completely or partially overlap one another, and the range of an object in the field of view is determined by adjusting the two images until the one lies exactly over the other. Other objects in the field at different ranges will appear double, the displacement of the images of any particular object being dependent upon its distance.

5. The two images in the field of view, instead of overlapping, may be separated from one another by one or several fine lines, or one image may be inset with the other. The image of an object on one side of the fine separating line is brought into coincidence or alignment with the corresponding image on the other side by some optical or mechanical device which indicates the range of the object. This method is usually referred to as the "Coincidence Method."

6. In the "Invert" system, which is well adapted for field service, the optical arrangement is such that one of the images, separated as before by a fine horizontal line, is inverted but not reversed right for left. It is usually the upper image that is inverted, as indicated in Fig. 15, but under certain conditions, the lower inverted arrangement illustrated in Fig. 16 offers some advantages. The appearance presented is that of an object and its reflection in the surface of a lake. This method is found advantageous when observations of range are being made upon ill-defined objects, such as bushes, stones, etc. It is commonly employed in infantry and artillery range finders, although not in naval range finders, where the targets are much better defined.

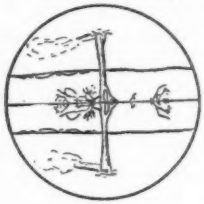


FIG 15

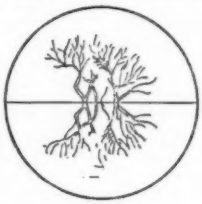


FIG. 16

FIG 17

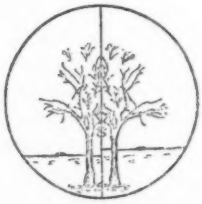


FIG. 18

7. A modification of the preceding method, known as the "Inverted Strip" or "Double Coincidence" system, is as follows:

The image in the main field is erect but right across this field extends a horizontal strip in which appears the inverted image from the other object glass. This image, although inverted, is not reversed, left for right. The effect is shown in Fig. 17. An object like a telegraph pole may extend above and below the inverted strip, and it is immaterial which edge of the strip is used in obtaining coincidence. The Hahn and Bausch & Lomb range finders have fields of this type.

8. Another method, which has been employed for observing upon ill-defined objects, consists in arranging the two images of the target side by side with a vertical line of separation, as indicated in Fig. 18. In this case, each image is erect, but one is reversed laterally, so that the appearance presented to the eye is that of a picture and its reflection. This effect may be obtained with a range finder on the "Invert" system by holding the base vertical.

The range is determined by adjusting one of the images of the target until the vertical line of separation bisects the distance between the two images. In consequence, however, of the lateral reversion above mentioned, the rotation of the range finder in azimuth will cause one image to move to the right and the other to the left, and unless the range finder is held very steadily in azimuth —a condition that is difficult to satisfy in windy weather or when the target is moving quickly—the accuracy obtainable by this method is not very great unless the object under observation is a sky line, a trench, or something of that nature, with good horizontal definition.

9. The last method that will be referred to here consists in arranging that the magnifying power of the one telescope system is different from that of the other. In this case, the images are generally separated by a fine horizontal line and are viewed through a single eye-piece.

If an object at a particular range appears in coincidence in one part of the field, it will not appear in coincidence at other parts. By determining the position in the field at which the object appears in coincidence, an indication of the range can be obtained. This method is, however, inferior in accuracy to any of the others already described.

Optical Arrangements.

The optical arrangements of fixed-base finders of types 5, 6, 7, and 8 will now be considered:

In Figure 19, LM and LM' are two plane mirrors set at an angle of 45 degrees so that a ray of light A will have a path to a. RM and RM' are two mirrors similarly arranged so that a ray B will have a path to b, the paths of the two rays from LM' to a and RM' to b, in the case of parallel rays, *i.e.*, from a light at an infinite distance, being coincident. Now, if the source of light is at a finite distance, a ray A will enter the left-hand mirror as before and be reflected to a; while a ray B' entering the right-hand mirror will have a path shown by the dotted line and be reflected to b. By this means, two partial images of a distant object are seen in the field of view, one above the other as in Figure 20a, and in the case of any object at a finite distance,

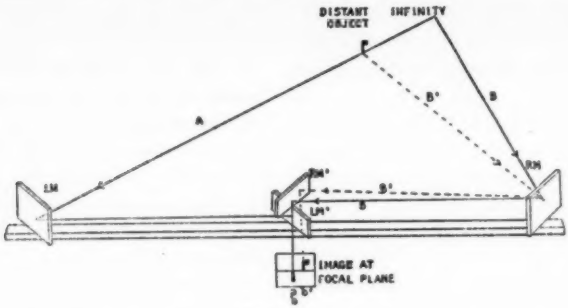


FIG 19

the two images will not coincide as they do in Figure 21b.

The interval *AB* (Fig. 20) between the two partial images increases as the distance of the distant object is decreased, and this interval might, of course, serve as a measure of the distance; but such a measurement would be difficult to make with sufficient accuracy, so that an optical expedient is adopted which will now be explained.

Figure 21a is a diagram of the right half of the system shown in Figure 19 with the addition of a refracting prism of small angle placed in the path of the rays from mirror *RM* and movable longitudinally along the path. The effect of this prism is to deflect the ray *B'* toward the line taken by the ray *B*, and if the prism is quite close to the mirror *RM'*, this deflection will be very small; while if it is quite close to the mirror *RM*, the deflection of the ray will be a maximum. Figure 21b will make this clear.

Now if we look into the mirror *LM'* and *RM'* with the instrument pointed at a flag pole and the adjustable prism quite close to the mirror *RM'*, we will see something like Figure 20a, the two partial images being well separated. We now slide the prism toward the mirror *RM* until we get a view like Figure 20b, the top and bottom of the pole being in coincidence.

It is evident that the position occupied by the refracting prism when alignment of the partial images has been attained constitutes an indication or measure of the range and therefore a scale attached to the prism and moving with it can be so graduated as to indicate the range directly in yards. This scale may be from four inches to several feet long, depending on the type and size of the range finder, and is thus capable of being divided into large, easily read divisions.

Most fixed-base range finders for field use utilize the principle of the prism

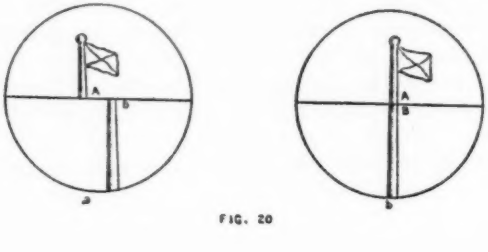


FIG. 20

and the coincidence of partial images of the observed objects. They all contain an inner frame on which the lenses, mirrors, etc., are mounted, and this is surrounded by an outer shell to protect against mechanical damage and to insure uniform temperature conditions. The adjustments vary for different types, but they are usually self-evident and simple.

General Principles of Adjustment.

The three adjustments ordinarily required on fixed-base range finders are: (1) adjustment of eye-piece focus; (2) adjustment for halving; and (3) adjustment for distance.

on prism field glasses, with a scale and index.

It is essential for the proper operation of this type of range finder that one field of view begin exactly where the other stops (Barr & Stroud, Fig. 20) or that the division line between the erect and inverted fields cut the view at exactly the same place in each field (Goerz, etc., Fig. 15). The adjustment by which this condition is obtained is known as the halving adjustment. With the Barr & Stroud, examine any well defined object with horizontal markings. If no markings are either duplicated or omitted at the di-

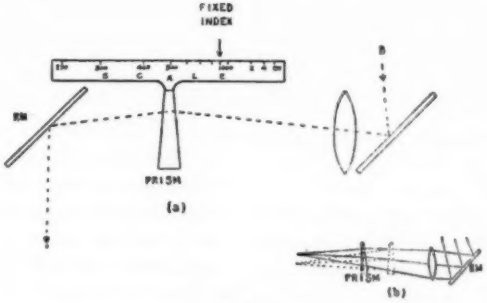


FIG. 21

The fixed-base range finder comprises two telescopes with a single eye-piece. This eye-piece is really a magnifying glass through which we examine the combined or superimposed images made by the object glasses of the telescopes. Observers whose eyes are not normal require the eye-piece to be a little nearer or farther away from the images than those persons whose eyes are normal. The adjustment is individual, and the criterion is a perfectly sharp and well defined field of view. The eye-piece focussing device is turned backward or forward until the field is sharp. Most range finders of this type have an adjusting arrangement like that

vision line in the field, then the instrument is in adjustment; if, however, there is any omission or duplication, the adjusting roller must be slowly turned until it disappears and the upper field of view seems to begin where the lower one stops.

Range finders of the "invert" type (Goerz, Hahn, Zeiss, etc.) are much easier to adjust for halving. Examine any object with a well defined horizontal edge, as the top of a chimney on the skyline or even the top of a telegraph pole. Bring the edge to the dividing line of the erect field by moving the range finder slightly; the inverted field should also show the edge of the

chimney exactly at the dividing line if the instrument is in adjustment. If it is not in adjustment, slowly turn the adjusting device, watching the two fields, until an exact adjustment is obtained.

The last adjustment is that by which the instrument is made to read on the scale the correct distance to the object under observation. This is known as the distance adjustment. All these instruments are made with such care that if the scale reads correctly the distance to any one object, it will read correctly the distance to any point within the range of the instrument. The various methods of making this adjustment for distance will now be discussed; the fourth one, that using an infinity adjusting bar, will be found preferable if one is provided with the range finder.

Distance Adjustment of Fixed-base Range Finders.

The distance adjustment of a fixed-base range finder consists in setting the scale to indicate the known range of one object, the partial images of which have been brought into exact alignment in the field of view, and if the scale is correctly graduated, it will then indicate the true range of other objects when the latter are brought into coincidence.

(1) Adjustment upon a celestial body.

As the range of any celestial body is, from the range-finding point of view, infinite, the sun, moon, or a star may be used for the adjustment of the infinity indication of the scale.

The sun is not usually a very suitable object unless partially obscured by mist or fog, and a bright sun at a considerable altitude is quite unsuitable, even if a dark glass be interposed between the eye-piece and the eye of the observer, because of the heating effect produced by the rays upon the optical parts of the instrument. The moon at low elevations is usually a very suitable object, provided the atmospheric conditions near the horizon are good, and the moon is to be preferred to a star owing to the fact that when working on the former, it is not necessary to use the astigmatizer, which may introduce a small error owing to slight defects of adjustment of the optical parts in the process of erection of the instrument. In practice, the weather and other conditions of observation are often such as to affect seriously the accuracy of night observations on the moon or stars, and if possible, the adjustment should be made on a clear and calm night.

(2) Adjustment upon an object at known range.

This method is only suitable for occasional use in the field when a chart is available and the position of the instrument and of some distant object can be located with sufficient accuracy. The method is, however, of special value for fortress range finders, because a pole or other suitable object can generally be erected at a considerable distance, and after that distance has been accurately determined, it may be used at any time for adjustment purposes.

(3) Adjustment upon two objects at unknown ranges.

It may be of interest to mention that there is another method of adjustment that can be carried out, in many cases, with advantage. Inasmuch as want of true alignment affects various ranges in proportion to their squares, the error in any range is four times that on half the range, and this fact can be made use of for adjusting purposes as follows:

Select two objects separated by a distance of more than twice the minimum reading of the range-finder scale, such for example, as the corner of a house *A* and a staff *B* stuck into the ground at a convenient spot. With the instrument at *B*, measure the range *BA*. The mean of several observations may be, for example, 962.5 yards. Then, when the range finder is set at a position *C*, half-way between *A* and *B* (and in the line *AB*), the ranges of *A* and *B* should each be 481.25 yards. Suppose that the position of *C*, which may be selected by stepping or by the use of the range finder itself, is *nearly* midway between *A* and *C*, and suppose that the mean of several observations of *CA* is 502.5 yards and of *CB* 510.3 yards. Then 502.5+510.3=1012.8yards, and 1012.8—962.5=50.3 yards, and as the 962.5 reading is more affected than the shorter readings, we see that in this case the instrument reads too low, and since the long range is affected about four times as much as each of the short ones, the true long range is approximately 962.5+(50.3×2)=1063.1. (Adding twice the difference would be exactly correct if the two partial ranges were equal.)

The rule is, therefore, that if the long range obtained is less than the sum of the short ranges, the instrument reads low, and twice the difference must then be added to the long range to obtain the value of the range to which the instrument should be adjusted. If the long range is greater than the sum of the short ranges, twice the difference is to be subtracted from the long range. A second set of observations should be made to confirm or rectify the adjustment. If the partial ranges are not approximately equal, the calculation is more complex.

(4) Adjustments upon an artificial infinity.

This may be accomplished by having two marks mounted upon a board or other suitable frame at a distance from one another equal to the base length of the range finder.

The images of the right and left hand marks, produced by the right and left hand telescopes respectively, are observed in the fields of view of the range finder, and when the image of one mark in the upper field coincides with that of the other mark in the lower field, the instrument is adjusted for "infinity."

In using the infinity adjusting bar, the bar should be set up at least 100 yards and preferably 200 yards or more from the range finder to be adjusted. The bar should be carefully set at right angles to the lines of sight of the range finder by sighting through the bar sight at the center of the range finder. The range finder should be set at the mark ∞ (infinity), which will be found *well* beyond the last numbers on the scale. Moving the range finder so that the bar is split horizontally by the dividing line between the fields, we should see through the eye-piece something like Figure 22a; if the images of the bar appear like Figure 22b or 22c, the instrument is out of adjustment, and the distance adjusting device must be turned carefully until the effect of Figure 22a is obtained.

Now move the scale so that the infinity mark is away from the index, and carefully bring it back until the effect of Figure 22a is again obtained; the infinity mark will probably not be exactly at the index. Try this several times before attempting to improve the adjustment, throwing off the infinity mark alternately above and below the index. If it is found that the mean of the several positions of the infinity mark

is close to the index, the adjustment is satisfactory; if, however, the mean is well off the index, a readjustment should be made.

Always make the adjustments in the following order: (1) eye-piece focus; (2) halving adjustment; (3) distance adjustment. Test the adjustments, if possible, immediately before using the instrument. If it is in daily use or likely to be used daily, it should be adjusted the first thing in the morning. This takes but a few minutes and insures correct operation.

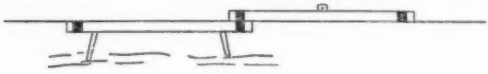


FIG 22 a

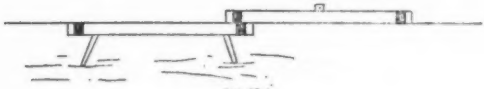


FIG 22 b

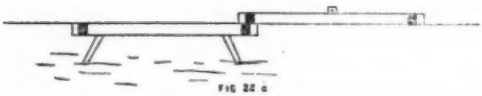


FIG 22 c

Accuracy.

The accuracy of any range-finding operation in actual practice must depend largely upon the nature of the object under observation and upon the atmospheric and other conditions of working, but assuming that the object to be observed, such as a mast or pole, is clearly defined and that the atmospheric conditions are favorable, the limit of accuracy attainable will depend upon the base length which determines the angle of parallax, and further, upon the smallness of the angle the instrument is capable of detecting.

Thus, for example, if the smallest angle the range finder is capable of distinguishing is ½ second, a range finder having a base of 1 yard would be able to distinguish between two objects at distances of about 2000 yards and 2010 yards respectively, whereas with a base length increased to 2 yards, the range finder could distinguish between two objects separated by 5 yards at the same distance of about 2000 yards. In practice, the base length is limited by such considerations as convenience, weight, and constructional difficulties.

In Figure 23, suppose AB represents the base length, that is, practically the distance between the centers of the reflectors at the ends of the instrument, and suppose C is an object situated at the minimum distance the instrument is arranged to measure, say, 400 yards.

Then since the base length AB is very short compared with the distance AC, the lengths AC and BC may be considered as practically equal, and the base length AB may be regarded as the arc of a circle described about the center C. The circular measure of the angle 0 is then equal to

$$\frac{AB}{AC} = \frac{\text{base}}{\text{minimum distance}}$$

Assuming the distance of C to be 400 yards, and the base length 1 yard, the

angle 0 is 1÷400, that is, approximately =8½ minutes or 1/7 of a degree. For a base length of 1 yard, this small angle is the total available for subdivision to indicate the whole series of distances between 400 yards and infinity.

A Second of Angle.

Few people have any clear quantitative conception of a second of angle, and as it is not possible on paper to illustrate the actual amount, the angle as indicated in Fig. 24 has been magnified 10,000 times.

In order to read a range of 2000 yards to within 1 per cent., a range finder of 1 yard base must be capable of dividing the angle illustrated into 10,000 equal parts.

An angle of 1 second is in circular measure .000005; that is, for example, the angle which is subtended by one millimeter at 200 meters.

The minuteness of the angle to be measured by a short-base range finder is indicated by the diagram, Fig. 25, in which *AB* represents the base length of the range finder, say 1 yard, and *C* and *D* are two objects at ranges of 2000 yards and 2020 yards respectively from the range finder. The distance between the two objects is, therefore, 20 yards, that is, 1 per cent. of 2000 yards, and to distinguish this difference of range, the instrument must be capable of measuring the angle between the two lines drawn from the objects *C* and *D* to the one end *B* of the base. In the diagram, moreover, the scale upon which the base is drawn is magnified 100 times, as otherwise its length would have been inappreciable compared with the range of 2000 yards.

As a further example, it is of interest to compare a range finder with an angle-measuring instrument, such as a theo-

FIG. 23

FIG. 24

FIG. 25

dolite. An ordinary 5-inch theodolite for surveying purposes is graduated to read by vernier to 1 minute of angle. In order to read 1 second of angle with the same facility, a circle of 25 feet diameter would be required.

Resolving Power and Magnification.

The unaided human eye is incapable of appreciating so small an angle as ½ second. From the results of many years of practical experience with range finders of the coincidence type, it would appear that under the most favorable conditions the unaided eye can resolve angles of about 12 to 15 seconds. A better average value is 30 to 40 seconds.

Although the range finder may be able to measure an angle of ½ second, the eye can therefore only appreciate such an angle when it is sufficiently magnified. It would be accordingly necessary in the above instance to use a telescopic system having a magnifying power of about 30 diameters.

If the magnification of the telescopic system were 15 diameters, an angle of not less than 1 second, measured by the range finder, could be appreciated by the eye, whereas if the magnification were 30 diameters, an angle of ½ second could be appreciated.

The accuracy of the range measurement under similar natural conditions is determined, therefore, not only by the length of the base employed but also by the magnification of the telescopic systems.

Accuracy of Coincidence Method.

The value of the resolving power of the eye, mentioned above as being 12 to 15 seconds, only applies to observations of the coincidence type in which the partial images of an object are separated by a fine line, and the adjustment is made by bringing the images into exact alignment at the separating line. The human eye, under such conditions, is capable of distinguishing with great exactitude any discontinuity or want of alignment, even when the definition of the edges of the object is not perfect.

Overlapping Image Method.

In the case of overlapping images, the smallest angle the eye can resolve is of more than twice the above-mentioned value even under ideal conditions, and in practice when the definition of the edges of the images is not perfect, it is not possible to determine with the necessary exactitude when the images are correctly superposed.

Stereoscopic Method.

In the case of stereoscopic vision, the images are superposed on the retina of the observer's eyes by the involuntary working of the muscles which direct the eyes. The action is a physiological one and is dependent upon the physical condition of the observer.

It is generally agreed as the result of practical experience among the armies and navies of the world that so far as accuracy is concerned, stereoscopic methods are much inferior to coincidence methods.

Inverted Image Method.

Range finders of the "invert type," already referred to as being often preferred for army purposes, where the objects to be observed are usually of irregular form and ill-defined, are considered by some users to be more accurate upon such objects than range finders of the ordinary coincidence types.

When one of the images is inverted, a coincidence error becomes evident as

a want of lateral symmetry between the images above and below the separating line, and on ill-defined objects, it is sometimes easier to detect errors of symmetry than errors of alignment. It is generally the upper image that is inverted, because in the case of the great majority of the objects that have to be dealt with, the most suitable parts of the objects for ranging purposes are directed upwards. The greater portion of the object therefore remains in view, not only in the lower field but also in the upper as illustrated in Figure 15. When the lower image is inverted, the greater part of the object is generally invisible in either field.

All range finders of the "invert type" have the disadvantage that a rotation of the instrument about its longitudinal axis causes the two partial images in the field of view to move in opposite directions at right angles to the separating line, and when the force of the wind is considerable, it is difficult to keep an indistinct object under observation, as the object is lost from view if it is allowed to pass the separating line.

The Self-Contained-Base Range Finder

Its Influence on Fire Effect of the Rifle and Machine Gun

By 1st Lieut. Robert Sears, 1st Infantry

SINCE the introduction of high-power guns made firing at long range possible, there has been a demand for a light, portable instrument for measuring ranges quickly and accurately. Optical firms all over the world have been competing for many years, but no instrument was produced which attracted serious comment until the self-contained-base type of range finder began to be perfected. In recent years, this type of range finder has been brought to such a high degree of effectiveness that its use in the field is indispensable.

It is hardly necessary to go into a description of the self-contained-base range finder. Practically every officer in the Army has become familiar with its construction and manipulation, and it is intended here to show only the influence which the range finder will have on the fire effect of the rifle and machine gun.

The best of these instruments of the shorter base for use of infantry and cavalry will in the hands of a skillful observer give ranges to obscure objects within an error of 1.5 per cent at ranges up to 2000 yards. Besides being extremely accurate, these instruments are light, portable, durable, easily adjusted, and so rapid of manipulation that ranges can be obtained to moving objects in from two to five seconds with almost as great accuracy as to stationary targets.

With so accurate an estimate of the range assured, it is certain that accuracy in shooting will now assume greater importance than ever before, and refinements will be essential which heretofore were considered superfluous, if not detrimental.

The effect upon the target depends upon the density of shots at the target, which in turn depends upon the location of the target with respect to the

center of impact and the depth of the beaten zone. It is therefore apparent that in the case of line targets, the estimation of range and the depth of the beaten zone will largely control the effect produced.

The assumption is made, after exhaustive experiments both in European armies and our own, that the probable error in estimation of range by the eye is ⅛ of the range or 12½ per cent. With this assumption together with that of the 1.5 per cent. error of the self-contained-base range finder and the mean dispersion of good, average, and poor shots determined by experiment at the School of Musketry, the table on this page has been computed to show concretely the influence of the range finder on fire effect of the rifle. The target chosen consists of prone silhouettes spaced one yard per figure as prescribed in the Infantry Drill Regulations for skirmishers and is a fair representation of the targets that will be exposed to rifle fire in war.

It is apparent from these tables that without an accurate range finder at long ranges, good marksmanship is at a positive disadvantage. Notice for instance in column 5 at 800 yards range and beyond that average shots get better results than good shots, while poor shots get better results than good or average shots at 1000 yards and beyond. In column 6, using the range finder, good

TABLE I.

GOOD SHOTS.

Range (yards)	Mean 50 per cent. zone (yards)	Probable error estimating range by eye (yards)	Probable error estimating range by range finder (yards)	Probable no. of hits estimating range by eye (per cent.)	Probable no. of hits estimating range by range-finder (per cent.)	Probable no. of hits when estimated range is correct (per cent.)
600	156	75	9	7.82	9.62	9.65
800	115	100	12	3.74	7.36	7.43
1000	90	125	15	1.01	5.72	5.86
1500	65	187.50	22.50	.00	2.96	3.32
2000	54	250	30	.00	1.65	2.17

TABLE II.

AVERAGE SHOTS.

600	185	75	9	7.13	8.22	8.25
800	135	100	12	3.86	6.30	6.35
1000	106	125	15	1.41	4.90	4.99
1500	76	187.50	22.50	.028	2.69	2.90
2000	64	250	30	.000	1.50	1.83

TABLE III.

POOR SHOTS.

600	370	75	9	4.11	4.25	4.26
800	270	100	12	2.86	3.23	3.24
1000	212	125	15	1.83	2.49	2.51
1500	152	187.50	22.50	.368	1.42	1.45
2000	128	250	30	.029	.871	.916

shots get the best results at all ranges.

If we consider in connection with the above table that whenever the probable error in range exceeds one-half the mean 50 per cent zone, combined sights must be used, we arrive at the following conclusions:

Estimating by Eye.

1. Good shots must use combined sights beyond 600 yards.
2. Average shots must use combined sights beyond 700 yards.
3. Poor shots must use combined sights beyond 900 yards.

Estimating by Range Finder.

1. Good shots must use combined sights at 2000 yards.
2. Average shots would never use combined sights.
3. Poor shots would never use combined sights.

A case not considered in the tables but one which might frequently occur in service conditions is that of the target which, due to conditions of atmosphere or to color, cannot be seen by the firers. Such a condition might be met by an attachment on the rangefinder for measuring the vertical angle from the target to some suitable aiming point approximately in line with the target. From this angle and the range to the target, the proper sight setting could be easily computed, and indirect fire thus used to advantage.

The influence of weather conditions on the flight of the bullet has never been considered heretofore except in individual firing on the target range. Extremes of weather, however, do have a material effect on the trajectory, amounting to as much as 50 to 75 yards at 1000 yards and increasing rapidly at more distant ranges. These errors greatly exceed the error of the rangefinder, and for this reason must not be ignored. The man with the range finder should be an expert on atmospheric conditions and should be supplied with all the necessary instruments for enabling him to make exact calculations.

The machine gun, equipped with telescopic sights and muzzle rest, largely eliminates personal errors, but this advantage is counteracted by the errors of the gun due to the instability of the mount.

In Table IV, the size of the mean dispersion or mean 50 per cent. zone is taken from experimental tests made at Monterey with the Benet-Mercié gun. The expected hits were computed on

TABLE IV.

MACHINE GUN.

Range (yards)	Mean 50 per cent. zone, (yards)		Probable error estimating range by eye (yards)	Probable error estimating range by range finder, (yards)	Probable no. hits estimating range by eye, (per cent.)		Probable no. hits estimating range by range-finder (per cent.)		Probable no. hits when estimated range is correct (per cent.)	
	1 gun	6 guns			1 gun	6 guns	1 gun	6 guns	1 gun	6 guns
500	147	294	62.5	7.5	11.20	6.92	13.10	7.20	13.20	7.20
600	110.5	221	75	9	7.70	5.57	11.60	6.20	11.68	6.21
800	80	160	100	12	2.51	3.83	10.10	5.41	10.30	5.45
1000	63	126	125	15	.24	1.73	7.75	4.15	8.17	4.22
1500	46	92	187.50	22.50	.00	.06	3.80	2.25	4.73	2.38
2000	38	76	250	30	.00	.00	1.73	1.33	3.06	1.53

the same target as that used in the preceding tables in order to compare the accuracy of the machine gun with the rifle.

If we consider in connection with the above table that whenever the probable error in range exceeds one-half the mean 50 per cent zone, searching fire or combined sights must be used, we arrive at the following conclusions:

Estimating by Eye.

1. With one gun, searching fire must be used beyond 500 yards.

2. With six guns, searching fire or combined sights must be used beyond 700 yards.

Estimating with Range Finder.

1. With one gun, searching fire must be used beyond 1500 yards.

2. With six guns, searching fire or combined sights need never be used.

The Provisional Machine Gun Firing Regulations have adopted the 75 per cent zone in considering searching fire and combined sights. This modifies the above conclusions as follows:

Estimating by Eye.

1. With one gun, searching fire must be used beyond 600 yards.

2. With six guns, searching fire or combined sights must be used beyond 800 yards.

Estimating with Range Finder.

1. With one gun, searching fire need never be used.

2. With six guns, searching fire or combined sights need never be used.

It must be remembered that the Benet-Mercié Gun is not accurate with its present mount and that results as shown in the above table when the range finder is used would be greatly increased by a more stable arrangement.

In conclusion, it seems certain that there will be three ultimate effects of the adoption of the range finder: first, the initial range for opening fire will be considerably increased; second, superiority of fire will depend more on good marksmanship; and third, there will be a demand for refinements such as telescopic sights and atmospheric instruments.

The Making of a New Unit*

By C. N. W.

ALTHOUGH for many months past units of the New Armies have been employed in gradually increasing numbers on all the fronts, the 1st July, 1916, will go down in history as the date on which the New British Army was held to have completed its training by being launched into the Battle of the Somme—the first really great British offensive of the war, on the Western front—and this New Army, leavened by the remnants of the incomparable old Regular Army, is composed of "officers and men who are not professional soldiers, but are the British people;" during those opening days of the great battle they "faced a fiery ordeal and emerged from it successfully;" all ranks "displaying their magnificent quality."

Yet in spite of the fact that since September, 1914, the units of the New

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Army have been raised in our midst, the very vaguest ideas still prevail as to all that goes to the making of a new formation, quite apart from the mere drilling and training of it; the British public, instructed by the uninformed journalist, seems to consider that all that is necessary to form battalions, batteries, brigades, or divisions equal to those of the "first seven divisions"—if indeed the public even now realizes what was the quality of those and the other divisions of the old Army—is to drill, and train in the methods of trench warfare, for quite a short time, the admittedly splendid new personnel; even in *The Times*, one finds a writer on "New Troops in the Making" (May 25th, 1916) committing himself to the statement that finished soldiers can be turned out from the raw material in a few weeks.

All sausages are alike externally, but the difference between the first-class sausage and the middling and the bad, is due as much to the methods of spicing and mixing the ingredients as to their mere quality; in a new unit, drill and all other training stand for the mixing, the inculcation of real discipline for the cunning addition of the spicing which turns out the perfect article, soldier or sausage. It must here be said that, partly from ignorance of history, and consequently of what the old Regular Army has done in the past, and of the qualities required for the doing, partly from the ingrained British habit of belittling its Regular fighting men, there is a strong tendency to belaud the "brains and initiative" of the new officer and the "superior intelligence" of the new rank and file to the depreciation of the corresponding ranks of the old.

His Majesty the King, in an address delivered to the gentlemen cadets of the Royal Military College, Sandhurst, on July 2nd last, said: " . . . . You will soon become officers in my Army, and as such you will have the great responsibility of watching over the welfare of your men and leading them in battle." (The order in which their responsibilities are placed is noteworthy.) "To become an efficient leader the first essential is that you should gain the confidence of your men, and this means that you must know how to lead them. Your time here is necessarily very short—you must therefore work all the harder in order to acquire the requisite knowledge.

" Knowledge alone is not sufficient. You must cultivate a high standard of honor, moral conduct, steadfastness, and resolution, and, above all, must be loyal to your superiors and to one another. These qualities have always been the distinguishing characteristics of officers in the British Army. Most of you have come from public schools, and I am sure you will through life, do your utmost to maintain their great traditions. . . . . I hope and believe that I may rely upon you to maintain, untarnished, the very high reputation of those splendid officers who have fought so gallantly in the present great war."

Notable words which, though addressed to young men of the same class as that from which the officers of the old Regular Army were drawn, set the standard for all officers, whether of the old Regular or new amateur type; and a very characteristic journalistic comment (*Pall Mall Gazette*, July 3rd, 1916) on the King's speech runs as follows: "But the King was speaking immediately to a class of youths who may be trusted to carry on all that is best in the old military traditions. The

advice applies to all who today receive the honor and responsibility of a commission. The war has effected a great change in this as in other respects. The doors have been thrown open more widely, and the officers who are leading our New Armies today are drawn far more indiscriminately from all ranks and positions." All of which though self-evident is harmless, but the scribe now proceeds, after the manner of his kind, to an ignorant depreciation of the old officer, while patting him patronizingly on the back; thus: "This more democratic system has its advantages. It ensures *a higher general standard* and a *wider variety of intelligence and ability in those who have to lead our soldiers.* The valor of the British officer in the past has never been impugned. The quality of leadership that springs from personal character and from a great and honorable tradition has also never been wanting. If the British officer has been deficient at any point it has been in certain *practical* qualities, *intellectual* rather than moral. These more practical qualities *should be available enough* among the young men who bear His Majesty's commission in the New Armies. But such qualifications do not complete the equipment of a successful leader of men. Our new officers are not the heirs of a long and glorious tradition. Many of them do not hail from the public school or the Universities, where the adage that manner maketh man is fully adopted. All the more important is it that they should, so to speak, *create their own tradition* and *cultivate those qualities of chivalry and self-respect and discipline* which are the essence of good manners and have always distinguished the British officer. Knowledge alone is not sufficient. It is important, *perhaps more important, than has been generally recognized in the past,* but it must be associated with those higher moral qualities enumerated in the King's address in order to produce the true leader whom his men will proudly and willingly follow."

Here we have displayed a quite typical ignorance of the high standard of professional attainment of the combatant Regular officer before this war broke out—a standard demanding considerable intellectual as well as practical qualities; and of the regimental system, or spirit, which made him the worthy heir of "a long and honorable tradition," and cultivated in him the qualities of "chivalry, self-respect, and discipline" which this scribe seems to imagine can be acquired by individual effort and all at once.

How, in the Regular Army, the regimental spirit was fostered "C.N." has set out admirably in a series of articles in *The Times* in June last: he shows how the young officer, in addition to being trained as a soldier, was taught the meaning of real discipline, which is the realization by each officer of his own responsibility; to place the regiment before self in everything, and to learn to know the men and how to handle them, sharing in their sports no matter at what personal inconvenience to himself, and winning their confidence. It took time, however, to turn out the old type of regimental officer; the process was leisurely; if a youth on joining a regiment was of the right stuff, he, sooner or later, became imbued with its traditions and "form" generally—even if he had not had the advantage (for it is an advantage) of having been at a public school; if he was not of the right stuff, he moved on elsewhere and possibly took to the lower forms of journalism. Contrast now the condi-

tions which obtained in the raising and making of the units of the New Armies. Here we had the old and the new officer thrown together to perform a task in common—the disciplining and training, in a hurry, for war of hundreds of raw recruits. The views of the Regular on matters of discipline, and his general outlook, were, by reason of his up-bringing, poles asunder from those of the new and even of the original Territorial officer: in spite of the legend that he did not possess "knowledge" or "practical abilities," the Regular knew his work thoroughly, and the new officer, however "brainy," had generally a very great deal to learn; not only drill and so forth, but many other things which go to the making of a good leader.

When the units of the first hundred thousands of the New Army were being raised and trained, the Old Army was still in being, and its senior regimental officers were employed with their own corps, so dependence had necessarily to be placed, in a great many cases, on retired Regular officers to do the work—the Dug-outs on whom so much scorn has been lavished—and right well they did it, all things considered. As, however, a good many of them had either been on the retired list for some years after completing their period of command of a Regular unit, or had never attained to the command of one, the results were unequal; I speak more particularly of the Service battalions and batteries than of the second line Territorial units, which were mostly raised by Territorial officers of the active or retired lists, or by ex-volunteers.

But in any new formation it is on the personality and quality of the senior officer, and especially of the Commanding Officer, that it depends whether that unit becomes truly disciplined, a live thing, an entity, working with one accord for and with its chief for the good of the regiment, or a soulless conglomeration of individuals—quite apart from the degree of drill and training which may be attained; in both the Service and second-line Territorial units, whenever the Commanding Officer possessed the faculty of command and was backed up by an efficient adjutant and a few good senior officers, battalions of the type portrayed by Ian Hay in "The First Hundred Thousand" resulted, in which the vinegar of the Old and the oil of the New Army were blended, and a real regimental spirit was evolved. . . .

But this, even under the most favorable conditions, was not easily arrived at; with two types of officers, each with the defects of its qualities, differing so radically in up-bringing, in conception duty and discipline, and in general outlook, it is not to be wondered at that in the early months of existence of the new units the professional Regular and the amateur new officer should not always have seen eye to eye, and that, till they had shaken down together, they should have formed somewhat unflattering opinions about each other. . . . .

To the friction which occurred in the early days another contributory cause was what I can but describe as the colossal conceit of a certain class of senior amateur officers; a conceit fully equal to the self-complacency of the Regular which our critic finds so trying. For some reason, or no reason at all, the belief is still held by the public, and was indulged in by a considerable section of amateur soldiers, that, whereas in every other profession or trade a period of apprenticeship is necessary before proficiency can be looked for, soldiering can be picked up by anybody and requires no previous training; that

the art of war can be applied by unskilled labor, in fact. The senior (generally Territorial) amateur officer very often fondly imagined that because he was letter-perfect (as he so frequently was) in the drill books, and had read a certain amount of military literature, there was nothing more he could be taught—and the chief offenders after the war had been running some time were those who, after serving a few weeks or months at the front, had returned for duty with a new unit in process of formation.

This class, whose views of war were as narrow as its experience of it (confined moreover to trench warfare) was limited, was particularly troublesome in a new formation, because it opposed openly or cavilled secretly at, all forms of training for officers and men except in trench-fighting, arguing that the encounter battle would never again be possible, and that, because artillery as an arm has increased so greatly in importance, all attempts to teach the new infantry to maneuver above ground, or to shoot except at point-blank range were a waste of time.

It is not, however, to be wondered at that this type should have existed in a nation given over to amateurism, and in this connection I cannot do better than commend to such gentlemen the book on "Ourselves and Germany," by Dr. E. J. Dillon, and especially the paragraph in it applying peculiarly to the know-all-about-it amateur officer, which runs as follows: "Englishmen in particular must learn the duty of self-abnegation for the welfare of the community" (for which read the regiment) "and substitute a scientific spirit for arrogant amateurism" (which applies to scathing criticism of the conduct of the war by higher commands, and of generals and staffs). I refrain from further counter-attack in this particular except to remark that the new officer, in spite of being so often a professed man of business, was not invariably a conspicuous success in administering the interior economy of a unit.

To the criticism that the Regular is self-seeking and selfish, the obvious retort is, so is every other professional man, including the politician. Soldiering is the trade of the Regular, and he is fully as much justified in playing for his own hand in pursuing it as the solicitor or mining engineer or chartered accountant is in his. As to being small-minded—that is a disability by no means confined to the Regular—and his tendency to "collect nothing but his own regular brand in his compartment" is quite natural; would not a solicitor or chartered accountant, entrusted with carrying out a special piece of work in his own particular line practically single-handed, but responsible at the same time for the instruction of a crowd of embryo solicitors or accountants in a rough working knowledge of law or accountancy, welcome the advent of a trained man of his own profession to assist him?

To turn now from the officers to the rank and file of the New Armies and consider how the men adapted themselves, while still in the raw-recruit state, to the utterly novel conditions of a soldier's life: I exclude the original Territorials who when war broke out were partially trained and had some conception of discipline. The New Army soldier had to commence from the very beginning; drawn from every class of society, he had hitherto been his own master in essentials, free to come and go as he pleased, and, according to his class and means, not bound to touch his hat to, or obey the orders of,

any other man except in so far as doing so affected his prospects of livelihood. The recruit of the Old Army had to undergo the same experience, it is true, but he joined a formed unit and was not handicapped as the new soldier was by finding himself in a crowd of others, and commanded by officers for the most part as raw as himself, without any equivalent to the old Regular noncommissioned officer to act as intermediary and prop.

But after the first strangeness of it had worn off, the new rank and file proved extraordinarily amenable to discipline on the whole, though, strange to say, it was men of the lower middle classes—junior clerks, shop-assistants, and so forth—and not those of the laboring or upper and upper middle classes, who were least so, which has been ascribed to the fact that from the same class a considerable number of the junior officers were granted commissions during the early stages of the war; with not altogether happy results on their fellows in the ranks who, prone as a class to the ultra-independent, resented being ordered about by brothers Tom and Dick or by cousin Harry, and very often only regarded the ranks as a mere stepping stone to becoming officers themselves.

But whether "Duke's son, cook's son, or son of a belted earl," keen to learn the new job in all its aspects they nearly all were; the early disciplinary troubles were mainly due to the utter contrast between the free life of the civilian and the necessary restrictions and observances imposed on the soldier.

From all I have gathered there was not, from the outset, on the part of the new rank and file the same antagonism to the Regular officer which was displayed openly or covertly by a certain section of new officers because the Regular, being accustomed to handle men and appreciating what life in the ranks is like, realized what the new recruit was undergoing and treated him with sympathy and understanding.

So the disciplining and the preliminary training progressed—up-hill work in the early days for those responsible, but as the weeks and months passed the grub recruit gradually effected his metamorphosis and became the butterfly trained soldier, not quite so well disciplined and trained as his old Regular prototype, as was only natural, but, while differing from him in some respects, strongly resembling him in others, showing the same tendency to "grouse" but carry on, to regard with the deepest distrust efforts to improve his messing and possessing equal powers of fascination with the ladies.

And, simultaneously with the progress in discipline and training, grew up *esprit de corps,* confined at first to the unit, but (at all events in the service battalions) gradually extending till it embraced the regiment, the traditions and past deeds of whose old Regular battalions set the standard to be reached by the new, when the supreme test of battle should come—as it has now for so many of them.

The "halo of the traditions of the old regiment" has been a very great factor in the making of the new units. Just now there is much journalistic gush about the "spirit of the New Army;" as if that spirit were something new, and not the legacy handed down by the old Regulars.

So much for the moral aspects of raising the new units.

The difficulties experienced in their physical training—using the term in the broadest sense—arose from quite other

causes than those due to the admixture of two opposite types of men in the commissioned ranks or to the newness of the majority in all ranks to the idea of discipline. New to military training they equally were, but the necessity for it in all its branches was so obvious as to need no demonstration, and it presented little difficulty to men so keen as those of the New Army and of such a generally high standard of intelligence and education.

That the general system pursued was a sound one, the performances of the New Army have proved conclusively; it was, after all, no new system, as the scribes appear to imagine, but the old regular course of progressive training modified to suit the circumstances of trench warfare and the fact that, whereas the training of the Regular recruits was reckoned in months, that of the New Army soldier had to be compressed into weeks.

The defects in the training lay, not in the system, but in the unequal observance of the syllabus laid down by the highest authority.

Thus in some commands the Brigadiers and Commanding Officers were left alone to establish, by steady drill, the surest foundation for steadiness under all conditions, before passing on to the many other subjects which had to be taught; in others, units were expected to run before they could walk, Brigadiers, instead of being free to supervise the preliminary training of their battalions, being called upon to prepare advanced tactical exercises each week, which their unfortunate brigades had to carry out, not yet knowing their right hands from their left; and regimental officers still ignorant of platoon and company drill, to say nothing of the most minor tactics, being required to write appreciations. As was to be expected, the units which had been thoroughly drilled and had not been hustled in their training turned out much better than the others.

Further, while some higher commanders ensured that the units entrusted to them received an all-round training, so far as the time available permitted, by preparations for the encounter battle and all that leads up to it, as well as for trench warfare, others took the short view that training for any form of warfare except trench fighting was a waste of time; here again units which had received an all-round training proved of far more value than those which had specialized in trench work and little else. But whether the training was carried out methodically or erratically, on broad or on specialized lines, the greatest hindrance to it from the regimental point of view was the multiplicity of courses of instruction to which young officers were sent from their units while still in the raw-recruit stage, with bad results to them and to their platoons and companies.

In spite, however, of all the drawbacks and shortcomings which attended the raising of the new units, the results have exceeded every expectation.

The New Army—*not* on a new model, but modelled on the old; trained on its system and imbued with its traditions, is proving its worthy successor, than which no higher praise can be bestowed.

This Army, formed of millions of civilians, disciplined and trained in haste at enormous expense, will, we all believe and hope, be the deciding factor of the war; this should give the politicians furiously to think on what would have been the course of the war, and what the saving of life and treasure, had the old Regular Army been of adequate strength in August, 1914.

Rapid Transportation of Infantry

By Lieut.-Colonel C. H. Martin, 18th Infantry

IN early September, 1916, General Thomas F. Davis, U. S. Army, commanding the Arizona District on the Mexican border, directed what is believed to have been so far the longest practice march in the United States by motor trucks. The march was made by the 2d Battalion, 18th Infantry, and 3d Battalion, 14th Infantry—18 officers and 489 men.

The command was transported by the 55th Motor Truck Company, which consists of thirty-three 1½-ton Velie motor trucks and two Dodge automobiles, with a personnel of mechanics, drivers, etc., numbering 51, commanded by Captain R. C. Kirtland, 22d Infantry. The march was made from Douglas, Arizona, to Roosevelt Dam and return, a distance of 665 miles, and consumed ten days.

The truck company was organized for the expedition as follows:

For transportation of troops....	26 trucks
For transportation of baggage and rations	5 trucks
For gasoline and oil	1 truck
For transportation of repair parts, etc.	1 truck

and was divided into three sections, one carrying the troops of each battalion, and one a ration and baggage section. Accompanying the column also were two motorcycles, intended to be used for reconnaissance, which, on account of the rough, broken roads traversed, failed us completely and had to be abandoned the second day out, and three automobiles for the accommodation of those officers who did not ride with the drivers on the trucks themselves.

It had been further planned to take along the Ilitz Rolling Kitchen, but experiments made before departure demonstrated not only that, mounted as it is, it would be shaken to pieces at the rate at which, at times, the trucks travel, but that it would not trail properly on the rough, broken roads with many sharp turns in Southern Arizona.

The maximum load of this truck is 4000 pounds. Although the body of the truck can accommodate 20 men comfortably seated, to prevent overloading two squads (16 men) with their full field equipment were seated in the body of the truck on four seats of 2 x 12 boards, one at each end and two in the middle, fastened on a light frame set snugly in the body of the truck. A sergeant or commissioned officer rode beside the driver. Provision was made for the soldier's comfort by permitting him to place on his seat the extra blanket carried along.

Four trucks, two for each battalion, were assigned for rations, and one for baggage. Seven days' rations were carried. Company and battalion equipment "A" was prescribed for the march with the exception of field desks, mosquito bars, shoe stretcher, arm-repair chest, and horse and mule supplies. The supplies were so distributed that no supply truck carried at any time a load over 3200 pounds.

In the normal organization of a truck company, one truck is assigned for the mess of its personnel, but by attaching this personnel to the different companies for rations, this truck came into the general use of the command, giving us 31 trucks instead of 30 as would ordinarily be the case.

The itinerary of the march was as follows:

September 15 Lv. Douglas 6.00 A.M. Ar. Ft. Huachuca 2.10 P.M	60 miles
September 16 Lv. Ft. Huachuca 6.05 A.M. Ar. Tucson 4.15 P.M.	73 miles
September 17 Lv. Tucson 12.50 P.M. Ar. Florence 8.00 P.M.	72 miles
September 18 Lv. Florence 8.15 A.M. Ar. Phoenix 5.35 P.M.	63 miles
September 19 Lv. Phoenix 10.25 A.M. Ar. Fish Creek 7.02 P.M.	62 miles
September 20 Lv. Fish Creek 7.15 A.M. Ar. Roosevelt Dam 9.15 A.M.	17 miles
September 20 Lv. Roosevelt Dam 4.15 P.M. Ar. Fish creek 5.30 P.M.	17 miles
September 21 Lv. Fish Creek 6.30 A.M. Ar. Florence 4.15 P.M.	52 miles
September 22 Lv. Florence 7.15 A.M. Ar. Tucson. (via Casa Grande) 7.15 P.M.	112 miles
September 23 Lv. Tucson 11.00 A.M. Ar. Empire Ranch 4.30 P.M.....	45 miles
September 24 Lv. Empire Ranch 6.30 A.M. Ar. Douglas (via Tombstone) 4.30 P.M.....	92 miles
Total mileage	665 miles

Just after crossing the Gila River on the 18th, telegraphic orders were received for the return of the battalion of the 14th Infantry to Douglas; this battalion reached Douglas on the return journey on the 20th. The rest of the march was made by the 2d Battalion, 18th Infantry, alone, with 19 out of the 33 trucks of the train.

As will be seen, the march was made in a leisurely manner with the exception of the march of 112 miles on the 22d when a record under most adverse road conditions was attempted. Suitable camp sites as a rule determined the day's march. There was no necessity of waking cooks at 3 or 4 a. m. in order to start the column at dawn to enable it to get into camp at a seasonable hour in the afternoon. Instead, it is shown that by leaving camp as late as the middle of the day, marches of over 70 miles could be made before night with the men arriving in camp without the least fatigue, ready to pitch camp or go into battle, and that moreover, this condition could be maintained indefinitely.

The average march for the ten days was 66½ miles per day. The total marching time from camp to camp was 84 hours, or an average of 8 miles per hour. Unquestionably on good roads, a maximum of at least 12 miles per hour could be maintained indefinitely. A 100-mile march per day of eight hours would be dependable.

The general route taken was the so-called "Borderland Road" from Douglas to Phoenix and the Apache Trail from Phoenix to Roosevelt Dam. These roads, however, were not strictly adhered to, especially in returning where a short cut across the desert was made from Superstition Mountain to the Gila River (25 miles) at Florence. From Florence to Tucson, a detour was made to include the old Casas Grandes ruins and the town of Casa Grande on the Southern Pacific Railroad.

At best, Arizona is not celebrated for its highways. During the past summer, the State has been visited by rains of unprecedented severity, which have left their marks even in the roads in innumerable dry washes. While generally these washes could, with careful driving, be negotiated by the trucks, in the vicinity of the Empire Ranch especially, the banks had to be cut down before a crossing could be effected. The Gila River at Florence had shifted its whole bed and had taken out the southern approach to the fine new concrete bridge across the river there; this necessitated the fording of that treacherous stream. Practically the whole morning of the 18th was spent in this task, yet a 63-mile march was made notwithstanding this delay. On finding that the

trucks could not cross under their own power, an attempt was first made to put them across by a four-horse team; this failing, long chains were attached to the trucks, and they were pulled across by the men. During the crossing, two of the trucks got out of the narrow ford and sank so rapidly in the quicksand that for a time their loss was feared. Had the train been equipped with a block and tackle, much of this trouble could have been avoided. Two other particularly difficult situations gave some concern. The Apache Trail at Fish Creek drops for a mile along the mountain side on a 20 per cent grade. In this distance, the total drop is over 1000 feet. The trucks went down and came up this precipitous mountain trail without difficulty. The road from Florence to Casa Grande has just been graded. The road bed now consists of a pile of sand and pulverized clay into which, in places, the trucks sank quite up to the hubs of the wheels. Although the pace was slackened, the train moved steadily on over a road of this character for the greater part of the day. From Casa Grande into Tucson, as from Superstition Mountain into Florence, we made our own road much of the way through the light, soft soil of the desert. This day's march of 112 miles, made in 12 hours, was the most severe test to which the trucks were put. No mud was encountered on the trip. I do not believe, however, that it would have been much worse than the soft, sandy road from Florence to Tucson. There are, of course, roads in soft gumbo soil which trucks cannot negotiate; so at certain seasons there are roads where neither horse nor mule transportation can travel.

I think this test demonstrates that light trucks can negotiate any road that loaded wagon transportation can.

The actual cost of the operation of the trucks was as follows:

2430 gallons gasoline at 24½ cents	$595.35	
100 gallons lubricating oil at 38 cents	38.00	
General repairs, gas leads, spring clips, etc.	8.00	
		$641.35

Average mileage on one gallon of gasoline: 7.6 miles.

Had the command marched, on an estimate that it could have covered the distance in 45 days (15 miles per day), the forage alone consumed by mounts of officers and the animals of the field train would, at current prices in this market, have amounted to $478.90

Freight charges on forage shipped by rail, or higher prices demanded in the mountains, would certainly have covered the difference notwithstanding the fact that the price paid for gasoline seems excessive.

A highly trained cavalry command of the same size might have made the march in 26 days—25 miles per day. The forage alone for the mounts and trains at current prices, making no allowance for cost for rail shipments or higher prices in the mountains, would have amounted to $4678.80

By rail at the current rate of 4 cents per mile the transportation of the troops alone would have cost.... $11,272.80

Of course, the extent of the deterioration of the trucks due to the movement enters into the question. This is

a most difficult factor to determine. The life of the truck is unknown. Like harness and wagons, should they be considered as never giving out but kept in serviceable condition by constant repairs? As these trucks were new, the repair item on this basis would be too low. Figuring the life of the truck tire as approximately 2500 miles, the tire depreciation on the trip would amount to 25 per cent and run into a cost of $2000. If this item is added to the above cost of operation of the trucks, we arrive at these comparative estimates for transportation of such a command:

By rail	$11,272.80
By mounted troops	4678.80
By auto truck	2641.35
By foot troops	478.90

To land troops at Roosevelt Dam from Douglas by rail would require movement over three different railroads and marching 42 miles from Mesa. Troop movements by rail are fixed and inelastic. They are proverbially slow, especially where large commands are concerned—not even counting the time involved in assembling motive power and rolling stock, in marching the troops to the point of embarkation and in the entrainment, which is especially great if there is much impedimenta. The end of the journey, especially in war, seldom finds the troops at the point needed, and further marching and confusion ensues. Quite different is a march by auto-truck trains. Here the movement, at speed, begins in the very camp of the troops. On a terrain where impassable obstacles do not intervene, the march is not even limited by the available roads. The troops can be landed at the exact spot needed. Should some trains be cut off, others will reach their destination on the other routes. Yet again, should the military situation change during the movement, part or all the troops could be deflected to the next vital point. All of this leaves out of account the ease with which railroads are disabled.

For a movement of this kind, mounted troops must be our basis of reckoning. Foot troops move incomparably the cheapest, but to cover this march would have required 45 days. The cavalryman would have required 26 days. The slow infantryman mounted in the motor truck, would, however, have increased his mobility three times that of the cavalryman with only about half the expense of transportation. The infantryman would arrive at his destination without fatigue, ready for any move before him and unhampered by the care of a horse.

Conclusions.

The 1½-ton motor truck can transport comfortably for long distances 17 fully equipped soldiers besides the driver, and for short distances 21.

On good roads, it can easily cover marches of at least 100 miles per day of eight hours.

It can easily negotiate any road that the present field train of troops can.

Their greatest efficiency being found in maximum loads and long hauls, motor trucks are peculiarly adapted to army use.

The efficiency of the gas engine has reached a point where it is dependable at all times.

Supplies for their operation can be obtained at every country cross roads with more ease than the forage for a large number of animals.

For even moderately long distances, transportation of troops by motor transport is cheaper and more adaptable than transportation by rail, and for short

distances the advantage is so marked that there can be no comparison.

When not in use, they entail no expense and little or no care.

Should danger arise of their falling into the hands of the enemy, they can easily be rendered unserviceable.

As demonstrated by this march, even in a rough, broken country motor transport increases the mobility of foot troops four and a half times and exceeds that of cavalry almost three times with about half the expense.

Colonel Edwin F. Glenn, 18th Infantry, who accompanied the expedition as an observer, commented on it as follows:

This practice march was undertaken for the purpose of demonstrating the practicability of transporting infantry troops from one scene of operation to another or to any threatened point in the least practicable time, and of testing auto trucks as a practical means of accomplishing this end.

The itinerary which was carried out demonstrated, beyond a doubt, that the auto truck can be utilized over all roads in Arizona and that they can, generally speaking, go over country where there are no existing highways. It was demonstrated that they could cross rivers with treacherous or quicksand bottoms, either by the power of the command whom they were carrying, together with their own power, or by the first alone. In the great majority of cases, the number of men (a sergeant and two squads, in addition to the chauffeur) is sufficient to move one of them over difficult places with very little delay and without assistance, and this is especially true where two or more of them are together, as will usually be the case.

There is no doubt, in my own mind, and has not been for a number of years, that what is known as the 1½-ton auto trucks can be advantageously and economically used, not only for the transportation of troops, but likewise for the transportation of supplies for them. In my opinion, provisions should be made for supplying all infantry organizations with at least a sufficient number of trucks to carry the ammunition and supplies, and replacing with them the present regimental transportation that is furnished to all infantry regiments. This opinion is confirmed by reports received from the existing European war, and is expressed in spite of the present high cost of gasoline, which is likewise due to the existing war in Europe.

Varied Ground

Movement of Kansas Regiments by Motor Trucks.

In moving two regiments of infantry from Eagle Pass, Texas, to San Antonio, Texas, four complete truck trains of thirty-three trucks each were required; all were trucks of three-ton capacity. Two trains of Packard and two trains of Locomobile trucks, with their gasoline tank cars and repair cars, were used. The two Locomobile truck trains left San Antonio on the morning of September 4, 1916, arriving at Eagle Pass at 11.15 P.M., September 5, 1916. Tanks were filled and trucks overhauled in readiness for the return trip.

On the morning of September 6, 1916, the 1st and 2d Infantry, Kansas National Guard, broke camp at Eagle Pass and prepared to load, which was accomplished without incident, although with some little delay. All of the equipment was taken, except heavy tentage, which was shipped by rail. Three trucks were required for each company, one truck carrying the kitchen equipment, and all carrying enough men to make up the required load. The regimental commanders and their staff rode in light cars. Company commanders and their officers rode with the troops on the trucks.

The start was made at 12.15 P. M., September 6, 1916. A halt was made one mile from Eagle Pass to form line; the train moved out again at 1.00 P. M. without incident, except for an occasional bad place in the road, which had to be repaired before trucks could be sent over it and for a halt to repair some minor troubles on a truck. There were places so bad along the route that the troops were called upon to help the trucks out of the holes, which they did by pushing them along.

The train arrived at La Pryor 5.30 P.M., September 6, 1916. Equipment was unloaded, camp located, and shelter tents pitched, and kitchens set up, all in a very short time after the arrival of the trucks. The camp of Company C, 2d Infantry, was complete in ten minutes from the time of unloading. All of the trucks were completely unloaded, and the trucks were parked at some distance from the troops. Tanks were filled, and cars overhauled.

First call was sounded at 5.00 A. M. on the morning of September 7th; camp was struck and packed, and troops were ready to load at 6.30 A. M. The start was made at 7 A. M. The trip was without incident, except for the few bad places in the road, which caused some little delay.

Lunch was eaten en route, the troops having been furnished with sandwiches in the morning. There were several small breakdowns along the route, but they were speedily repaired by the men of the repair cars. Several old bridges which had not been built to carry such heavy loads were encountered en route, and in several cases, they broke under the strain and caused some delay before they could be used. The head of the train arrived at Castroville at about 4.15 P. M., September 7th. The troops went into camp near a small river; owing to breakdowns, all troops were not in camp until after dark. The command left Castroville at 7.00 A. M., September 8th. The trip was without incident, except for the usual bad spots in the road and one bad old bridge, which required great care in going over. The column arrived at San Antonio

about 10.45 A.M. and passed through the city, arriving at Fort Sam Houston at 11 A. M. The train was reviewed by General Funston and staff. Shelter tent camp was made, pending the arrival of the heavy tentage.

Troops were all in excellent condition, and all seemed to enjoy the trip, except that they became tired sitting in cramped positions on the wooden seats of the trucks. However, they all voted it a remarkable undertaking, and are glad that they were the first troops to make a long motor-truck trip.

The total distance traveled on the trip was 322 miles, half of which was with troops on board. The time which elapsed from the hour of departure from Fort Sam Houston to the hour of return was approximately 95 hours. Had the troops been ready to move upon arrival of the truck companies at Eagle Pass, the column would easily have been able to reach its destination on the evening of September 7th.

Movement of 1st Battalion, 23d Infantry, by Motor Trucks.

Upon the receipt of information that a party of bandits had crossed the border, the 1st Battalion, 23d U. S. Infantry, was ordered to proceed on August 1, 1916, by motor truck from El Paso, Texas, to Finlay, Texas, a distance of 72 miles.

The battalion received instructions about 10.30 P.M., August 1, to make ready to take the field with five days' rations. At 11.00 P.M., the trucks designated for the transportation of the battalion reported, and at 11.20 P.M. the battalion was entrained and under way. The equipment consisted of ten 3-ton White trucks, and the strength of the battalion was 177 officers and men. The command reached Old Fort Hancock at 4.45 A.M., Hancock Station at 5.30 A.M., and Finlay at 1.00 P.M.

Shortly after leaving Fort Hancock Station, a stretch of sand was encountered over which about six hours were required to cover a distance of about 16 miles. To get through this stretch, it was necessary to corduroy the road with mesquite brush.

The reported bandit raid turned out to be a "false alarm," and the battalion started on its return journey to El Paso at 6.15 A.M., August 3, and reached its destination at Camp Cotton, El Paso, at 5.15 P.M., same date.

Two troops of cavalry had been sent to Finlay on the same mission via the Southern Pacific Railway, passed the truck train at about 3.30 A.M., August 2, and detrained at Finlay at 5.10 A.M. They returned to El Paso by marching, taking three days to reach their destination.

This experience appears to demonstrate that an infantry command can, with about 16 men to a truck, stand about 72 hours continuous duty and be in condition to fight a good day's fight at the end of the journey. Well organized and trained, it can average 8 miles an hour; even if this average is only 5 miles, the total distance will be 360 miles, and it is difficult to conceive of a situation where so great distance would be necessary.

Our own experience as well as the European war appears to demonstrate conclusively that hereafter, the rôle of rapidly moving a body of troops to any threatened point must to a considerable extent be assigned to motor transport.

Cost of Equipment, Field Army Troops.

	Quarter-master	Ordnance	Engineer	Signal	Medical	Total
Headquarters	.....	.....	$3,263.00	.....	.....	$3,263.00
1 regiment Infantry	$149,354.66	$71,705.44	271.60	$2,073.69	$536.35	223,941.74
1 regiment Cavalry	366,213.92	174,011.58	790.60	2,111.84	536.35	543,664.29
1 btln. 6" Howitzers 1 " 4.7" " 1 " 4.7" Guns	402,839.91	1,804,275.23	120.00	3,821.77	1,509.95	2,212,566.86
1 regt. Mtn. Artillery	258,523.22	474,821.19	120.00	3,821.77	536.35	737,822.53

Equitable Distribution of General Officers.

	Authorized strength of arms	Percentages	Just distribution of general officers of the line †	Present distribution of general officers †
Infantry	1,853	46.6	12.116	11
Cavalry	860	21.5	5.590	5
Field Artillery	372	9.3	2.418	2
Coast Artillery	800	20.0	5.200	5
Engineers (line officers)	103	2.6	.676	3
Others *	.....	.....	4	4
Total	3,988	100.0	30	30

* Generals Wood, Funston, Bliss, and Barry.
† Chief of Coast Artillery is also included in this column.

A "War of Munitions?"

This war has been "a war of silver bullets," a "war of resources," of "attrition," a "war of mechanism," a "war of positions," and just now it is a "war of munitions." This last catchword is likely to prove the most deadly, particularly when paraded as a certain principle of victory. It has had its use in increasing the output of munitions, but the war has been full of operations which have been won or lost independently of shell supply. The Russian general Radko Dimitrieff told (the author) on the Dunajec, shortly before the unlucky battle of Gorlice-Tarnow, that he had plenty of shells; and *most Russian retreats, and many other retreats in the war, were not at all determined by shortage of munitions.*

The shortage of munitions is, of course, due to shortsightedness somewhere, but meanwhile the "war of munitions" catchword fosters the idea that *mechanism will do what man was meant to do.* The Germans have no catchwords.

Probably a really serious military disaster would convince us (the British) that there is no magic way to win the war. Probably the war can only be won by military means: by putting into the field better armies than the enemy's, led by better generals. "This is a war of War."—Robert Crozier Long, in the *Fortnightly Review.*

Strength of Regular Organizations in Southern Department on September 15, 1916.

Organization.	Enlisted.	Authorized peace strength.
3rd Infantry	753	1336
4th Infantry	854	1336
6th Infantry	885	1336
7th Infantry	803	1336
9th Infantry	650	1336
11th Infantry	779 plus 150(10/13/16)	1336
12th Infantry	956	1336
14th Infantry (less 1st Bn.)	603	1336
16th Infantry	860	1336
17th Infantry	995	1336
18th Infantry	910	1336
19th Infantry	989	1336
20th Infantry	804	1336
22nd Infantry	875	1336
23rd Infantry	909	1336
24th Infantry	1700	1336
26th Infantry	813	1336
28th Infantry	832	1336
30th Infantry	1026	1336
34th Infantry	898	1336
35th Infantry	632	1336
36th Infantry	841	1336
37th Infantry	839	1336
1st Cavalry (less Troops "B" & "M")	732	1015
3rd Cavalry	1067	1015
5th Cavalry	1025	1015
6th Cavalry	1072	1015
7th Cavalry	849	1015
8th Cavalry	1137	1015
10th Cavalry	1027	1015
11th Cavalry	1018	1015
12th Cavalry (less 1st Sqd.)	753	1015
13th Cavalry (less Troop "I")	1021	1015
14th Cavalry	1071	1015
16th Cavalry	1134	1015
17th Cavalry	1099	1015
3rd Field Artillery	647	873
4th Field Artillery (less Hq. 2nd Bn., Bats. "E" & "F")	653	873
5th Field Artillery	730	873
6th Field Artillery	873	873
7th Field Artillery	648	873
8th Field Artillery	797	873

Editorial Department

The Government of the Army.

An article published under the caption of "The General Staff" is a feature of the October issue of the *Military Historian and Economist* of unusual interest to the Army. This article is in substance a sketch of the administration of the War Department from the end of the Civil War down to the present time, and bears particularly upon the relations of the General Staff to the Bureaus of the War Department. As a whole it is a story which will not leave a pleasant impression upon any one who is interested in the efficiency of the Army.

It is well, however, to maintain a balanced view of this question. The line of the Army has been prone to attribute the deficiencies of our military system to the bureaus and often to individuals in control of them. The continuance of practically the same conditions under a long series of Bureau chiefs and even after the inauguration of the detail system should have taught us to look for causes more deep-seated than the personality of individual officers. There must be something inherent in the Army itself and in other features of our military system to give rise to conditions which so persistently resist the various cures that have been applied to them.

The case is, moreover, by no means one-sided. Many officers of the line of the Army in positions of influence have considered it their duty to advance the special interests of the arm to which they belong without over-much regard for the general interests of the service. This statement is not of course of universal application, for there have undoubtedly been many officers in influential positions too broad-minded to take so narrow a view of their functions.

It is plain that in considering this question of army government, we are confronted with a problem of elemental human nature. We should face this fact squarely and without evasion. It will not do to brush aside the factor of human interest as a matter of inconsequential detail to be settled by extra-departmental adjustment. For if there is any one characteristic that will destroy the military quality of an army, it is diversity of interest and aim. The fundamental quality of a military force is community of purpose without which nothing worthy of the name of an army can exist.

Community of purpose implies a common control. There must be in the War Department an agency endowed with complete power to direct all activities of the military establishment. The conception of the War Department as a collection of Bureaus, each independent in its own sphere, is so anomalous from a military point of view as to place it beyond the pale of discussion. Nor can such control, in the full and efficient sense of the term, be exercised directly by any individual, by whatever designation he may be styled. A really effective control, characterized by continuity of policy, can only be exercised through a governing body.

It is an elemental characteristic of human nature to seek for an increase of power. Few men willingly occupy a subordinate position if an opportunity offers for control in a larger sphere. It ought, therefore, to cause no surprise that the attempts to create a governing or controlling body in the War Department should meet with strenu-

ous resistance. Human nature willingly subordinates itself only when it clearly perceives the advantage of subordination and when *it has confidence in the capacity of the directing power.*

It is not enough, then, that the law should create a governing body vested with plenary powers of control. The governing body must be endowed with such a degree of *prestige* that its policies will be accepted as the product of the best judgment that the Army can develop.

The two essential elements of prestige in a military institution are demonstrated capacity and military rank.

Has the governing body as so far constituted been endowed with these attributes to the extent that might be desired? This may well be questioned. That the majority of officers chosen for general staff duty have been able men, is probably true. But the method of selection depends too much upon favorable acquaintance with the personnel of the selecting boards and too little upon exacting requirements in respect to special qualifications for general-staff duty.

Moreover, aside from the question of the capacity of the officers selected, the system of selection makes no provision for special training for general-staff duty. It is beyond all reason to expect that any officer, no matter how efficient he may have shown himself to be in command of troops, shall without especial preparation be able to take up the duties of a position that requires him to pass upon the big national questions coming under the purview of a general staff. Efficiency in the command of troops is only one of the qualifications for general-staff duty. In other words, a general staff can not be efficiently built up by simple detail; it must be forged through a long process of special training of its members before they are selected for detail. Something of the process that is involved in the creation of an efficient general staff may be gathered from a description of the method by which the German General Staff is detailed as described in an article dealing with the subject by Captain Bjornstad in the *Military Historian and Economist:*

The biggest step (in advancement) is the general staff, but for that reason, it is the most difficult. The competition is strong, and yet an obscure officer does not labor under any appreciable disadvantage. It is not necessary that he be known to some general officer. Every officer has an opportunity to make himself favorably known to his colonel, and the colonel, in the nature of the case, must each year confine his selection to five or six possible candidates at most. But having won the colonel's approval and designation, the candidate must compete within the army corps. Here he is rated on the competitive test only. If successful in the corps examination, he competes during the next three years for a chance at a probationary tour with the general staff. While on probation, he is still competing for a permanent appointment.

To see how severe this competition and elimination is in practice, let us follow the class which entered the war college in any given year; say the class of 1910. In the preceding year, from two to eight officers in each regiment sought their colonel's designation, or say, 1200 in the whole army; of these again, 133 entered the war college for the three years' course. Of the 133 who entered the war college perhaps 110 or 115 finished. Of these, about 50 were attached to the general staff for one, two, or three years. And of these 50, about 20 or 25 were finally appointed to the general staff, that being the average of appointments annually. In short, if appointments were pro-rated among

the regiments, a given regiment would get an appointment about every eight or nine years.

I wish now to invite attention to the effects of this system, prefacing my remarks by observing that the rules of the game are adhered to and the policy is well understood and not deviated from except under very special circumstances. A newly appointed second lieutenant sees that he has about six or eight years to serve (as a lieutenant) and that he must try for the regimental designation. He has several things to accomplish during that time. He must have a care as to his personal conduct, of course. He must learn how things are done, and then how to do them, which is different and more practical. Also he must convince the colonel that he knows. During these years he must so conduct and develop himself that his colonel can comply with regulations which require him to certify to the following:

The officer designated—

1. Is thoroughly trained in practical work and possesses excellent military qualities.
2. He has seriousness of purpose, combined with patience.
3. His personality and character are consistent with future employment or use in high rank.
4. He has a rugged constitution and health which requires no coddling. . . .

The competitive examination includes the following subjects: formal tactics, applied tactics, weapons and munitions, fortifications, map reading and aptitude in terrain, history, geography, mathematics, and French or Russian. You have a fair index to the preparatory work that the young officer must accomplish when you consider that Griepenkerl's problems were prepared for his benefit to assist him in passing the examination in one of the eight subjects enumerated; that is, applied tactics.

Doubtless this is a system of designation that will not appeal to many of us. It is so much easier to rely upon the chances of selection by the present method than to be required to strive for the honor through long years of effort. But we must not allow our inertia to stand in our own light. It is an absolute requisite for the prestige of the General Staff as a governing body that its members shall have demonstrated their intrinsic fitness for that function. This must be beyond contest or cavil.

It is not necessary to follow slavishly the details of a system adopted by another army. It is obvious that some of the features of the method described would not apply to our present conditions. Some such procedure as that above described is, however, an essential for continuity of general-staff policy. By the selection of officers who have gone through a special course of preparation for general-staff duty and served a probational period with it, familiarity with policies already inaugurated and with the reasons for their adoption would be insured. Under our present system, an officer must serve a considerable length of time after his selection before he is familiar with the policy previously developed and with the working of the general-staff machinery.

By the adoption of a system which places the selection of candidates for the General Staff in the hands of commanding officers from company to regimental commanders, a product representative of the best that the Army can produce would be insured and the members of the governing body would be placed beyond any possible imputation that other influences than their fitness operated in their selection.

The second requisite, as already stated, to the prestige of the General Staff as a governing body is military

rank. Relative rank is the basis of the exercise of authority in any military organization. As matters now stand, the balance of rank in the War Department is on the side of the governed, rather than with the governors. This is an utter incongruity which must be eliminated if there is to be an efficient coördination of War Department machinery. It is running counter to all human nature to expect that officers of the high rank of the present Bureau chiefs will accept in a thorough spirit of coöperation the authority of policies inaugurated by a group of junior officers.

This is, moreover, a requisite which fits in exactly with existing gaps in our general-staff organization. At the present time, there are no agencies responsible for the efficiency and development of the greater part of the more important branches of the service. The Infantry, Field Artillery and Cavalry drift along subject only to a general supervision, but with no agency responsible for the development of detailed policies of instruction, equipment, and general efficiency. To cover this gap, boards of officers are periodically convened to deal with some particular subject, as for example the drill regulations of the several arms. During the long period intervening between the convening of different boards, no continuous supervision of the development of tactics takes place, and the new board commences its revision without the benefit of the continuous consideration and study of tactical questions from the viewpoint of contemporaneous developments. Other boards are convened for the consideration of types of machine guns, rifle sights, field artillery pieces, and so forth. The conclusions of these agencies depend entirely upon their particular composition and cannot have the effectiveness of the developments of a continuing institution.

They are, moreover, without responsibility for the development of the arm which their members represent. There is today no one agency in the War Department to which the supreme commander can turn and say, "You are responsible for the development of the infantry (field artillery, cavalry) arm of the service, the evolution of its tactics, its methods of instruction, the suitability of its equipment for the peculiar nature of its service. What action have you inaugurated to correct this or that defect complained of (unsuitability of rifle sight, ununiform instruction, unserviceable machine guns, etc.)?" Yet no efficient army in the world is constituted or can be constituted without agencies vested with that responsibility. In European armies, they are usually termed "inspections" and are presided over by officers of high rank.

Provision for Chiefs of Infantry, Field Artillery, and Cavalry, presiding over infantry, cavalry, and field artillery sections ("inspections"), is an essential in the future development of the General Staff.

These constantly recurring boards of officers, charged with the solution of questions that properly pertain to a general staff, are a wretched makeshift, justifiable only by reason of deficiencies in existing organization. Nothing could be more typical of our inveterate tendency to view big questions in a piecemeal fashion. There is scarcely any important question relating to national defense that has not been delegated to these evanescent institutions. Boards almost without number have passed upon the problem of coast defense as if it were an issue utterly independent of general defense, and land-defense

boards have followed in their trace, likewise to deal with the proposition assigned to them as a separate issue. A board of officers has been convened to consider the question of the number and location of mobilization supply depots. Doubtless another board will be convened later to consider the general question of mobilization. The inversion in the natural order of procedure is, to say the least, remarkable. But even if the logical order of consideration in all these cases were followed, institutions in the nature of boards of officers can seldom be effective for the solution of these large problems of national defense. For they do not bring to the consideration of their problem the result of long years of special study of the subject, nor are they able in the nature of things to bring their conclusions into proper relation to other cognate questions. It may be true that even with the most perfectly developed general staff, it would sometimes be necessary to summon officers of the Army at large for the consideration of special questions. But such officers should not, under a proper system, be constituted as an independent board, but should be directed to report to the existing agency under whose purview the question under consideration naturally comes. It is difficult to see how results of any lasting value can otherwise be obtained.

We would not be understood, in pointing out the necessity for chiefs of the different arms of the service, as advocating any extension of the system by which special agencies usurp the functions of direction of the general military proposition and achieve a measure of independence in their own province. We have already more than enough of that tendency. The special agency must be strictly confined within its specialty. We assume that over and above the special agencies and in more immediate relation to the directing authority of the General Staff, there would be sections charged with the function of developing the larger questions of policy in accordance with which operations of each special section would be carried on. We have sometimes speculated as to what extent this principle of subordinating the special to the general has been observed in the past operations of our General Staff. We are rather curious, for example, in regard to the principles upon which our divisional organization is based. We have wondered just how the different results announced at various times were arrived at and whether before entering into the details of the composition of a division, it was ever determined what its length as a mobile march unit should be within approximate limits, and what should be its approximate frontage in combat. Being familiar with the habit of inverting the logical order of procedure to which we have already referred, we have been somewhat inclined to suspect that an infantry committee went into session and determined the infantry strength necessary for a "division"—whatever that term may signify—and that thereupon committees of other arms likewise went into session to determine the strength of their components and that the resulting products, when lumped together, constituted a "division." Now a properly constructed division must, like a properly constructed house, have a ground plan and an elevation. Its approximate length as a march unit and its approximate frontage in combat are fundamental data that must be arrived at before the details of its composition can

be determined. After its frontage as a combat unit has been determined, the number of rifles and guns required for that frontage can be tentatively fixed by the sections of the proper arms and then the whole adjusted to conform to the limitations fixed by its length as a march unit, and the other necessary adjuncts added. This is of course a bald statement of a process, cited by way of illustration, the working out of which implies a vast amount of detailed work and investigation.

In order that the work of the sections of the General Staff, headed by chiefs of the several arms, may be subjected to practical tests, experimental units of each arm should be stationed in or near the national capital and placed at the disposition of the corresponding section.

Mere government is not of course the ultimate function of a general staff. Government is only a means necessary for the exercise of its real function, which is to orient the development of the military forces of the nation toward a common purpose in the national defense. This is usually described as the duty of developing the doctrine, both tactical and strategical, toward which every activity of the military establishment, its training, organization, and tactics, must be oriented.

Frankly, we do not like this word "doctrine" as applied to the function of a general staff or a military force. We wish there were some other term more descriptive of the iron purpose with which a military force must be imbued to achieve its task as an implement of destruction. "Doctrine" savors entirely too much of intellectualism and puts into the foreground an entirely subordinate military quality. For it is above all intensity of purpose that most keenly sharpens the human intellect and devises the means to the end. Doctrine evolved as a result of mere study of the forms that have proven successful in military history will have put little effect upon the effectiveness of a military force. But the question assumes an entirely different aspect when the student approaches the subject in the spirit of research of the methods which are capable of giving effect to his purpose. A definite purpose is therefore an indispensable pre-requisite to the evolution of a doctrine. The "normal formations" that characterized our regulations a score of years ago were an indication of a state of extreme purposelessness. A doctrine conceived by way of imitation and without grasp of the purpose that lies behind it may be in no way superior to a normal formation but merely the same principle transferred perhaps to a higher sphere.

All doctrines are to be judged by the extent to which they embody the fundamental purpose of a military force; the *destruction* of its opponent. Anything less than this as a final object is mere trifling with a serious proposition. We are, of course, not visionary enough to believe that as we now stand, we are capable of destroying anything really worthy to be described as a military force. This does not, however, alter the nature of the object which must control the future development of every agency of national defense.

At various periods of history, different doctrines have been held which have more or less completely embodied this fundamental idea. In the war of 1870, for example, the attack was characterized by an enveloping action on the opponent's flank, and we have since adopted this idea in our tactics. A successful envelopment may result in the defeat and perhaps the rout of an op-

posing army, and a series of battles characterized by this method of action may finally result in its complete destruction. But there is nothing inherent in the enveloping form of action that insures success. For is not the flank of an enveloping wing equally exposed to the counter-envelopment on the part of an active, enterprising opponent? Without the spirit which lies behind this form of action and which animates all parts of the military force and orients them toward the accomplishment of its object, the adoption of envelopment or any other form of action as a tactical doctrine is a barren vanity. Between 1870 and 1914, the idea of destruction of the opposing army as contrasted with its simple defeat undergoes a more complete development, and the most successful actions of the present war are characterized by the encircling and surrounding of the opponent armies. But the encircling form is of itself of no more value than the enveloping; its real significance as a doctrine of war lies in the iron determination of which it is a manifestation, to hold the enemy to his positions, cut off his escape by surrounding him, and destroy him on the spot. During the early part of the present war, a force consisting of three army corps was cut off from all contact with supporting troops and completely surrounded—"encircled" if that term is to be adopted as descriptive of this situation. So sure are their opponents of their destruction that they report it the world over as an accomplished fact. These three corps face about, cut their way through the opposing army, and rejoin their own lines. Nothing could demonstrate more clearly the impotence of mere form. Shall we as a result of the present war incorporate the encircling form in our tactics as we have already done in regard to envelopment, or shall we be content with simply digging a trench? It does not seriously matter, so long as we do not grasp the purpose behind the form.

Many of the statements that we have made in this discussion will doubtless appear elementary and even trite. We have felt it necessary to make them because they bear directly upon the most serious obstacle that confronts the General Staff in the successful performance of its functions: namely, the lack of collective purpose in the personnel of the Army. As a unit, the Army is weak-willed and vacillating. It is incapable of that continuous coördinated effort toward a common end which is the mainspring of an efficient military force. It is lacking in positive character and operates chiefly by a balancing of opposing interests. Of individual purpose, there is more than enough; it is indeed precisely the divergence of the several individual purposes that negatives any possibility under present conditions of developing the Army into a really efficient force. It would be almost impossible to constitute an army along lines more fatal to any collective efficiency, that is to say, military efficiency, than those which now regulate the advancement of our commissioned personnel. How could one possibly expect of human nature that it will bend all its energies to the development of the Army as an instrument of national defense and at the same time say to every officer, "The greater the increase you can secure for your arm of the service, your corps, or department, the greater will be the reward bestowed upon you. However long and faithfully you may labor in the duties of your office or may study to discover the most

efficient means of the defense of your country, it will make no difference in your personal advancement." How is it possible that under these conditions the dominating aim of individuals should be other than the promotion of the means that lead most surely to their own advancement—the increase of their own arm, corps or department; or that disdaining such means while others employ them, they should not fall into an attitude of scepticism on the whole question of military efficiency? How could any doctrine of national defense whatever superimposed upon such a basis as this be other than a hollow mockery?

Even the best-intentioned man may become so blinded by his own personal interests that he will in all sincerity advocate fallacious measures without a suspicion as to their fallacy. "Doctrines," wisely said Colonel Montaigne, "are the offsprings of emotions." He might have added that their professors often have no idea as to their real parentage. Certainly the emotion of self-interest has given birth to some strange doctrines of national defense in our Army. Self-interest places before the eyes a veil that makes it extremely difficult to see clearly on any military subject.

As we have already said, it will not do to brush aside this question of personal interest as a matter of inconsequential detail affecting the individual only and having no bearing on the efficiency of the Army as a whole. Without unity of purpose on the part of individuals, there is no such thing as collective efficiency. Unless our military system can be so modified that individuals are constrained by interest to seek for the same ends, it is idle to talk of military efficiency. Our first and greatest problem is to devise some means of harnessing all this energy that spends itself in the advancement of purely personal interest, to the chariot of military efficiency, or at least to prevent it from clogging the wheels.

This question is not insoluble as some would have it. If there is sufficient will, the way can be found. The trouble with past attempts along these lines has been that they have approached this problem from the standpoint of the adjustment of personal interests involved in legislation instead of attempting to find a basis for its complete elimination from legislative questions. Equalization of promotion is not the basis for the settlement of this question, though it may be a necessary consequence. In a previous editorial in these columns, we discussed the promotion question from the standpoint of equalization. We did so reluctantly and only because the issue had been presented in that form. Equalization alone will leave the problem just where it stood at the beginning. Moreover, if the subject is approached from this standpoint, it is sure to give rise to the suspicion that it is being used as a pretext to secure what advantage can be derived from it, after which the propaganda will be dropped and such additional advantages as are otherwise obtainable will be sought. It is perfectly evident that the so-called "equalization" provisions of recent legislation have accomplished no purpose whatever. If this question is ever to be solved, it must be approached from the broad viewpoint of eliminating considerations of personal interest from influence upon army legislation and military policy. Such a solution must definitely settle the question and leave no reasonable ground for contest as to its justice.

We are not wedded to any particular

solution of this question. But we are satisfied that a method can be found by which the problem can be solved, and the evil consequences of the present promotion system definitely eliminated.

It is occasionally proposed that as a remedy for existing promotion evils, a system of promotion by selection be adopted. Now selection presumes as a basis the existence of ideal conditions. The purpose to be accomplished by selection must be clearly developed before that system can be successfully applied. Have we in mind any such purpose even vaguely outlined for whose more perfect execution officers should be selected? Would not selection under existing conditions be controlled by the same individual motives that inspire present activities? It seems to us that the whole atmosphere must be cleared of its present murkiness before selection can be successfully applied. A system of selection superimposed upon present conditions would leave untouched the motives which induce the several elements of the Army to seek special legislation. For it is obvious that there would be many more opportunities for selection in some branches of the service than in others, and the reason for the continuance of present conditions would therefore continue to exist. If after we have gained some clearness as to our object as a national agency, selection comes as a means of increasing our effectiveness for the end established, it should be welcomed. As we now have no such common end in view, how can we devise a legitimate basis for selection?

Elimination of individual interest from influence on legislation and military policy is therefore the first necessary step toward increased general efficiency. But if our present system is so designed as to favor individual interest as opposed to national necessities, how can we expect that these individual interests will not prevent the adoption of any plan to eliminate motives of individual advantage from influence upon legislation? This is indeed a serious question, for we may as well frankly recognize the fact that the greater part of the details of military legislation are framed as the result of personal touch of individuals with legislators. There is, however, an influence which, if it can be successfully brought into play, will be more powerful than motives of personal advantage; that is, professional interest. We believe that the greater part of officers of the Army are earnestly interested in the work of their profession and desire nothing more than the existence of conditions under which they can devote themselves whole-heartedly to their professional duties with the assurance that while so engaged, their interests will be protected and that their prospects for advancement will not suffer through their failure to take measures in their own self-defense. The past ten years have been marked by an unusual awakening of the Army to the possibilities of the military profession. We have succeeded in extracting ourselves from the rut of normal formations and have begun to grasp the scope for initiative of individual commanders from the highest to the lowest. We are beginning to catch the inspiration of a new method of instruction that makes an appeal to the artistic or creative spirit (which exists to a greater or less extent in every man) by assigning to every commander a "mission," that is, a purpose which he must accomplish by the adaptation of all means at his disposal —by coördinating and subordinating

military values, in the same way that the artist in other fields attains his effects by the combination of artistic values. In both artist and commander, the controlling force is the power and inspiration of purpose. The word "mission" does not adequately express this idea. Like "doctrine" it lacks virility and savors too much of intellectualism. If such a thing were possible, it would be highly desirable to carry out a revision of our military vocabulary for the purpose of eliminating many of these artificial terms applied to the trade of war which do not accord with its dynamic nature. For the terminology employed not only indicates but affects the state of mind with which the subject is approached. It is in fact the showy intellectualism ("high-browism"), which has been attributed to the method of instruction by the assignment of tactical missions, that has caused it to be received with a great deal of scepticism by a large part of the service. It is certain that the armies in which the applicatory method was originated had a sterner purpose than the fostering of any mere intellectuality. They saw in it a means of developing the individual initiative, of strengthening the back bone of military commanders by placing them in situations where they must reach decisions without the possibility of shirking responsibility, and above all, of imbuing all ranks with such a unity of purpose and concentration of effort that when they struck a blow at their adversaries, they did so with every ounce of power of which their forces were capable. It is nonsense to describe an army trained along these lines as moved by a spirit of slavish submission to superior authority. Such an army must always know exactly what it wants to do as well as how to do it—an enormous advantage in war.

As in the case of the more general term "doctrine," the spirit that underlies the theory of tactical "missions" must be comprehended. It is this spirit upon which we must rely if we expect the Army to eliminate the individualism of interest which now impedes its progress and makes any government, in the complete and positive sense of the word, an impossibility. We may be able to borrow the design of 16-inch howitzers or caterpillar "tanks" from foreign sources, but we must look within ourselves if we would really discover the purpose which is the motive force of any efficient army.

In discussing this question of the government of the Army, we have endeavored to set forth what seem to us to be the more deep-seated causes of the difficulties of unified control which are independent of the form of government and which will persist unless directly attacked, no matter what form of government may prevail. So long as each branch, corps, or department has vested interest in promotion, there can be no such thing as army unity nor in the full sense of the term, a real army. We have dwelt with perhaps what may seem excessive insistence upon the elemental necessity for a common purpose throughout the Army, for the reason that without it government is an empty form which it is idle to discuss and because we believe that its importance is not fully appreciated either by the country at large or the Army itself. Have we ever gauged the extent of the influence of a silent, steady purpose working over a long period of years and penetrating all ranks down to the lowest, upon the outcome of a war? We fear not. From all

evidences that have become apparent, we find it difficult to avoid the conclusion that our current conception of an army efficient for campaign is that of a collection of individuals trained in the technique of the several arms and assembled when the necessity for active operations arises. The objective attitude with which we are accustomed to look upon military questions makes it more than doubtful whether the Army as a whole has grasped the full force of the fact that purpose controls all the developments of training, technique, and organization and in itself embodies the fundamental qualities of discipline and morale. It is significant that in nations which in a military sense are most clear as to the ends to be attained, there is a singular absence of the so-called "moral" military literature: the man or the army that clearly sees that end that must be reached has no need of exhortation or other artificial excitant. But purpose with its effects on training, organization, and technique is a matter of slow growth; mainly for this reason, this magazine has never had any confidence in the various schemes for the organization of armies with two or three months' service advocated by those who pin their faith to numbers.

In a nation like ours that depends in time of war upon the expansion of its forces by increments which must be trained after the outbreak of war, it is even more essential than would otherwise be the case that clearness and unity of purpose should characterize the officer corps whose influence will extend over our entire war forces. That no such clearness or unity now exists but that on the contrary there are as many doctrines of national defense as there are branches of the service is beyond argument. To create that unity and clearness is the primary function of the General Staff, and the greatest problems that confront it in the effective exercise of this function relate to the measures necessary to increase its own effectiveness and the elimination of the influence of individual interest upon military policy.

When this has been accomplished, the General Staff may be able to approach the as yet almost untouched problem of how this country shall be defended.

Since the above lines were written, the decision of the Secretary of War, confirming the General Staff in the function originally conferred upon it, has been published to the service. This decision holds out a hope for better days, for it conserves the only possible means by which a united and efficient army can possibly be created.

The Character of the Present War.

Half-truths are often more dangerous than total error. For through their epigrammatic character, they often produce a striking effect when total error would fail entirely to carry conviction. For this reason, there is the more temptation to resort to them when one desires to enforce a particular conclusion. The danger in their use arises from the fact that they often lead to inferences even beyond the intention of their author in his desire to create a particular impression.

A statement somewhat of this character appears in one of a series of "Tactical Notes" entitled "Firing by Map" published over the initials "A. N." in the October issue of the *Military Historian and Economist*. As introductory to an argument for the necessity in this country for greater atten-

tion to position warfare and its consequences, the writes states: "The war in Europe has now passed its second year. Its development has been such that it may now almost be called an artillery war, especially on the western front."

We doubt whether the author intended to create the impression which such a statement would probably create if literally interpreted. We feel sure that he would not wish to have it taken as his meaning that artillery is almost the only force engaged in action or at all events the only force that is exercising any effect on the course of operations. Yet this is logically the deduction to be made from the statement, and it is so certain to be so interpreted by the casual reader that we feel moved to an attempt to inquire as to what extent it is true.

There never has been, and if we may judge by developments of the present war to date, there never will be such a thing as an "artillery war." Artillery, like every other arm, has a certain function which it may perform more or less completely. According as it is more or less capable of fulfilling its function, its value and importance increases. But it never can transcend the limitations established by the fact that it is an agency that acts by fire alone. It performs *its* task but not the task of other arms.

It is not our purpose here to enter upon an argument as to the relative effectiveness of the several arms. To attempt to do so would be to embark on an endless discussion which could lead to no satisfactory conclusion and serve no legitimate purpose. What we desire to bring out is the fact that the increased importance of artillery in the present war is in no wise due to any encroachment upon the province of infantry, the realm of short-range action.

What is meant by an "artillery war?" As artillery is an agency that acts by fire alone, one possible interpretation is that the power of artillery fire is so great as to destroy all power of the offensive. But it is fairly evident that were the opposing forces equipped only with the present small arms and sheltered behind barbed-wire and earthworks, the offensive would be equally difficult. Indeed the necessity for suppressing the defensive power of the opposing small arms plays a very large part in the increased importance of artillery.

Another possible deduction from the expression "artillery war" is that the effect of artillery fire is so powerful that when concentrated on a section of the hostile line, the infantry may advance under its protection without the necessity of engaging in close-range fighting. If this is so, there should be no necessity for an infantry advance as it would manifestly play no part in the engagement; one echelon of artillery could advance under the protection of the fire of another and take up an advanced position from which it in turn could open fire and an advance by successive echelons of artillery effected. We have heard of no advances of artillery of this character in this or any other war. The advance can only be made by the man who carries his weapon in his hand—manifestly for some purpose.

We feel it necessary to apologize for the elementary character of the above discussion, but what is said follows as an inevitable conclusion from the postulate "artillery war."

With the isolation of the several branches of the service that prevails under our system of training, each arm

is prone to center its attention on its own sphere of action and forget that anything at all is going forward in the sphere of the other arms. From this weakness we would absolve ourselves as little as any other arm. In this connection, we are somewhat minded of the Russians of the 17th century who Voltaire tells us believed that the world was created in the autumn as it was in that season that harvests ripened and all things came to maturity—forgetting or perhaps ignorant of the fact that in other parts of the world, the autumn of the Russians was the spring of other nations. For those who can see only the autumn of the long-range sphere of action, a reading of the articles by Captain Laffargue of the French army which we have published in recent issues of this magazine should prove broadening as well as enlightening.

As regards the element of fire alone, there have been in all wars for the past century, and we may safely say that there will always be in the wars of the future, two distinct elements: the element of short-range fire, the infantry, and the element of long-range fire, the artillery.

Practically every method of delivering long-range fire finds its counterpart in a corresponding short-range implement. The rifle and machine-gun bullet corresponds to the shrapnel ball, and bullet and ball are most effective under practically the same conditions of combat. The shell of the light and heavy guns finds its analogy in the rifle grenade which, Captain Laffargue tells us in his "Advice to Infantry Soldiers" is capable of inflicting greater losses than the bombardment. The projectiles of the howitzer find their almost identical counterpart in those of the trench mortars and mine throwers.

It cannot be denied that at the beginning of the present war, the possibilities of long-range weapons had been developed to a higher degree than those of the shorter ranges. The exquisitely perfected rapid-fire artillery piece represents a much higher state of development in its own field than the rifle with which the armies of all belligerents were equipped. No material advance had been made in the improvement of the rifle since the magazine feature was first introduced. The model with which the French infantry was equipped was of the year 1880. On the other hand, a complete revolution in artillery weapons had been effected during the 10 or 12 years preceding the war. That the rifle in use was not adequate to the situation which developed can be deduced from the feverish haste with which efforts were made to remedy the deficiencies of short-range weapons by vastly increasing the number of machine guns. That the improvements demanded in the field of short-range weapons will ultimately lead to the introduction of the automatic rifle is beyond a reasonable doubt. For the automatic rifle will serve equally well in position warfare as in the war of movements. Moreover, prior to the war, but little attention had been given to the development of grenades, trench mortars, and mine-throwers, and only improvised equipment of this class was generally available to meet the needs of the situation that developed. There can be no doubt that there was room for immense progress in this field.

If as we have said, artillery has not encroached upon the province of infantry, what is the true explanation of the increased importance of that arm in the present war, beyond the increase in its effectiveness in its own sphere?

Without attempting to state dogmatic conclusions, we believe that some light can be shed on this subject by a consideration of the two elemental qualities of military forces, fire power and mobility.

These two qualities stand at opposite ends of the scale; they are in a sense complementary. That is, a situation which calls for an increase in volume of fire involves a corresponding decrease in rapidity and scope of maneuver. Inversely conditions which permit of the development of rapid and extensive maneuver involve a corresponding decrease in the volume of fire. It is impossible to endow a force with both maximum fire power and maximum mobility. The extremes of either of these qualities can only be purchased at the expense of the other. Such extremes are therefore to be sought in respect to either quality only when the other is valueless.

This is not to say that maneuver is in itself a destroying or vanquishing element as on a chess-board or that fire is not the supreme destroying element under practically all circumstances. It is here merely a question of *volume* of fire required to produce a *given effect*, whether of destruction or protection, and this volume of fire is in an absolutely inverse ratio to the rapidity of maneuver that characterizes a particular operation. A force which advances frontally against a hostile position manifestly requires a greater amount of fire protection than one which has succeeded in outflanking its opponent and which is thus confronted with a less formidable obstacle to its advance. While the fire of the attacking force is even more effective in the latter case than in the former, its effectiveness is not due so much to its volume as to advantage of position gained by maneuver; and the number of implements required to produce the necessary fire effect is correspondingly less and the necessity for agencies of mobility proportionately greater.

For these reasons, artillery when properly used has never been assigned to the wings of an attack in maneuver warfare in anything like the proportion required in the center. Hindenburg's massing of artillery on his center at Tannenburg shows us that this principle is as correct today as it was in the days of Napoleon.

It is evident that the total composition of a force that attacks both front and flanks in a maneuver operation will differ greatly from that of one which can attack only frontally as in position warfare.

The two elements which in the past wars have embodied the extremes of these two powers are artillery and cavalry. They still do so though the mobile element has in the course of the past century been greatly modified by introduction of two additional factors, rail and motor transport. Artillery possesses the minimum independent power of maneuver; cavalry has proportionately the minimum power of fire.

Infantry, the basis of all armies, combines both powers in evenly balanced proportions; its power of fire and its power of maneuver are ultimate in all military operations. As Captain Laffargue has expressed it in his "Advice to Infantry Soldiers," "the infantryman is the workman of victory." The organization of forces must always vary directly with the needs of the infantry, for no matter how completely other arms fulfil their tasks, there is no decisive success except through the success of the infantry. Nothing which

has transpired in the present war has in the slightest measure shaken the validity of this principle which is still the keystone of all military tactics.

In the war of positions now taking place on the western front in Europe and for the most part on the eastern front as well, all attacks must be frontal. Hence the only auxiliary combatant arm that can further the action of the infantry is the artillery. Since there are no flanks around which cavalry can maneuver, that arm disappears almost entirely from the composition of the fighting forces.

From these considerations, we think that this conclusion is justified both by theory and common sense: *the significance of the increased importance of artillery in the present war lies not only in its increased efficiency but also in the fact that in so far as the three combatant arms are concerned, the artillery has absorbed the entire auxiliary function.*

Thus it might be said that if motor and rail transport be left out of consideration as agencies of mobility, the two variables in military forces are artillery and cavalry, the one constant infantry. While artillery and cavalry stand at the opposite ends of the balance which swings up and down according as the conditions of warfare are those of maneuver or those of siege, infantry stands at the fulcrum and is practically invariable under all conditions of warfare. That this is true in fact as well as theory may be inferred from statements of General von Rohne, perhaps the most prominent artillery expert of Germany, and General Percin, one of the best known French artillerists, quoted in the *Artilleristische Monatshefte*. General Percin estimates the proportion of artillery to infantry on the western front at one-fifth and General von Rohne at a considerably smaller fraction. If these estimates are correct, it would appear that the proportion of infantry to the total force is actually greater than it was in the days of Napoleon.

These conclusions are considerably modified by the developments of the past century, and particularly the last decade, in the field of mobility. In considering the proportions of field artillery and cavalry as complementary, the cavalry was taken as typical of the factor of extreme mobility. Two other agencies have entered this field which considerably alter this comparison, *i.e.*, motor and rail transport. These agencies are not, as is sometimes the case, to be considered exclusively as a means for the transportation of supplies. They may serve either as a direct means of mobility as well as a line of supply, though the limitations of the railroad in respect to the former are much narrower than those of motor transport. Nevertheless, the railroad was the sole agency of mobility that made possible the crushing victories of Tannenburg and Angerburg. For obvious reasons, the more flexible mobility of motor transport will make more universal its application as means for the rapid transportation of troops in the vicinity of the battlefield.

The antithesis of the conditions of trench warfare, in which a disappearance of artillery even remotely approaching the elimination of the mobile elements on the western front would take place, would be a very rare occurrence in modern war. Such a situation might perhaps arise only in the headlong pursuit of an utterly demoralized and routed force.

It is unfortunate that in our Army there has been a tendency to confuse the function of the different arms with their importance and to consider the term "auxiliary" as equivalent to "secondary." This confusion has become evident in recent suggestions that the term "coördinate" should be substituted for "auxiliary" as being more in accord with the relative importance of the arms. The description of an arm as auxiliary has, however, nothing to do with its importance, but relates exclusively to its tactical function. The term "coördinate" does not express any functional idea whatever, if not indeed a false one. For it does not define the direction from which the coördination must come. In the combat action of a force, the coördination must be from the rear toward the front and not *vice versa*. The infantry does not advance so as to make the action of artillery possible, but the artillery employs its fire to make possible the advance. It is in this sense, and not in respect to importance that the term auxiliary should be understood. It is perfectly plain that neither the advance nor the fire could accomplish any purpose independently and that as far as importance is concerned, they stand on an equal footing. But the term "coördinate" conveys no idea of the tactical bond that should exist between the arms. We conceive that in the realm of anatomy, the right and left legs are coördinate, but we cannot comprehend that the same relation exists between the heart and the lungs.

Only in the sense that the artillery vastly predominates among the auxiliary arms is it correct to describe the present conflict as an "artillery war."

The Battle of the Future.

The writer quoted in the preceding editorial states further:

"It seems fully established that in *any* war of the future, whatever be the nature of the preliminary actions, both sides will ultimately resort to trenches covering strategic points whether for offense or defense. The methods which have hitherto been taught will still be valuable for the *preliminary actions*, before either adversary has been deprived of the liberty of maneuver, but when the *impasse* arrives, *intrenched positions* will be used, and *trench methods* will prevail."

The italics in the above quotation are ours.

So for us the battle of the future is to be a long drawn-out, continuous engagement, characterized by indecisive preliminary operations whose principal object is the gaining of contact between the opposing forces, after which they will settle down to a long period of attritional combats and finally reach a conclusion by exhaustion of one or the other belligerent.

It is easy to succumb to the fascination of a purely objective contemplation of contemporaneous events. Under the spell of this fascination, the series of events which led up to the present situation on the western front, the advance to Marne, the retreat to Aisne, and the war of positions, become as guide posts on a fore-ordained route, and indecisive *preliminary actions, impasse, intrenched positions*, and *trench methods* all follow each other with the sequence of an inevitable fatality. The human element becomes as plastic clay, molding itself to a rigid framework of interlocking situations. The human will is supplanted by automatism, and the will and pur-

poses, the causes of effects observed are lost from view.

It would be well to consider some of these causes before we definitely conclude that we must follow over the route marked by contemporaneous events in Europe.

During all time unchanged by the character of weapons, there have been two general classes of military engagements, the static and the mobile; in other words, the siege and the war of movements. The question of importance at the present time is one of proportion; to what extent may we expect the conditions of siege operations or those of maneuver warfare to prevail?

All great wars prior to the Russo-Japanese war were essentially maneuver operations and were decided by the issue of maneuver engagements. Sieges were only local operations involving relatively small fractions of the total forces engaged. In sieges, fire plays the preponderant rôle; in mobile operations, fire is greatly modified and its volume relatively decreased by the element of maneuver. Fire is essentially defensive; that is, its effect is to delay the close contact of the opposing forces through which alone victory can be achieved. Every increase in the power of fire arms has resulted in an increase of the power of defensive and of the difficulties of a frontal assault.

The increasing difficulties of executing a frontal attack, due to increase in the effectiveness of fire arms, must lead more and more to attempts on the part of the offensive to outflank or envelop its opponent. The delaying power of fire against a frontal advance will greatly favor a movement against the flanks or rear by increasing the length of time available for its development. A movement which aims at penetration and to this end masses its forces in the center will in general stand scant chances against the more quickly developing maneuver of an enemy who elects to attack a flank. This consideration must inevitably lead to attempts on the part of each adversary to reach out for the other's flank with consequent great extension of the fighting lines. This was true in the Russo-Japanese War, where the average density of the attacking lines was only about three men per yard; it would have been true on the western front in the present war but for the limited extent of the theatre of operations in comparison with the strength of the forces engaged.

Why is it then that the last two great wars have been wars of positions when we might have expected maneuver warfare to be developed to a greater extent than in all preceding conflicts? To arrive at conclusions on this point, the conditions under which operations were conducted must be carefully considered. In the case of the Russo-Japanese War, the answer to this question is found in the nature of the communications of the theatre of operations. Extremely poor roads, scarcely more than trails, were available for the movement of troops, and their advance was painfully slow. Daily marches of from two to five miles were often the rule, even when not in contact with the enemy. Now the value of maneuver lies in the rapidity of its execution. Slow and cumbersome maneuvers are comparatively easily met by counter dispositions, and there is no scope for execution of lightning movements in the Napoleonic style. Consequently, the value of maneuver was discounted throughout the war. Difficulties of supply made flanking or enveloping movements of wide scope out of the question. We have

only to consider the enormous difficulties of supply under which Nogi's envelopment of the Russian right flank at Mukden took place to comprehend the reasons for the conspicuous absence of maneuver from the Manchurian campaign. Slight though the scope of the envelopment was, it was conclusive of the issue of the battle and illustrates the decisive character of enveloping action as compared with the frontal attack.

In the theatres of the greater part of the operations which have been carried on in Europe in the present war, the difficulties in regard to communications are entirely absent. The highway and railroad system of central Europe offers every facility for the rapid movement of troops and the transport of supplies. We might, therefore, expect that maneuver engagements characterized by the most extreme mobility would be a pronounced feature of the present war. And in fact the history of the early part of the war completely justifies this expectation. Never before in the history of the world have campaigns been conducted with the lightning rapidity of movement that marked the German advance into France and the early operations in East Prussia. Then the sea interposed a barrier to flanking operations on the western front, the war of movements came to an abrupt stop, and the war of positions ensued. But this was in no wise due to the intrinsic value of the trench. It was a consequence of the restricted area of the theatre of operations as compared with the strength of the forces engaged—a direct result of the trained Nation in Arms. The deduction from the present war in Europe that the type of warfare which will hereafter prevail will be of the character of that now taking place would seem to be justified only where the same causes exist. The present war itself offers sufficiently numerous illustrations of what will take place where space is available for maneuver. Tannenburg, Angerburg, the Battle of the Masurian Lakes, and the recent battles of Hermannstadt and Kronstadt all demonstrate that a trench that can be flanked has no permanent value. There were trenches and barbed wire at Tannenburg, but that did not prevent it of being one of the most decisive and destructive battles in the history of the world. Does anyone believe that had France been unable to put a less powerful army into the field, the results at the Marne would have been otherwise than at Tannenburg, that trench warfare would now be taking place on the western front, or that any such series of situations as indecisive *preliminary operations, impasse,* and semi-permanent *intrenched positions* would have succeeded one another?

These maneuver engagements as at Tannenburg, Angerburg, Masurian Lakes and so forth are not in the nature of small actions preliminary to a general engagement. They are immense battles complete in themselves involving the almost total destruction of the defeated armies. At Tannenburg alone, a force larger than the entire Regular Army and National Guard of the United States was totally destroyed.

The basis of this question is after all the old fundamental military question of men per yard. From two to four million men of the entente forces on a front of 400 miles produce *impasse,* etc., on the western front. On what extent of front will a force of 300,000 men, the maximum trained force that even the most hopeful can at present foresee in this country, be able to produce the same conditions? To what

areas can this frontage be applied so as to bring about an "impasse?" What are the probabilities of such areas becoming theatres of military operations?

Let us be a little less objective and put a little human will into this equation—at first on the part of the enemy. What region will an active, aggressive, enemy who seeks to obtain decisive results select as the objective of his attack? Will he, as some have fancied, elect to land at eastern end of Long Island and move on New York City, his front constricted on both flanks by sea and his advance arrested indefinitely by a comparatively small force, requiring him to transport overseas a vast quantity of ammunition for the maintenance of *tirs de barrage*, etc., incident to an "impasse," thereby diminishing the tonnage available for the transport of troops and with time fighting against him and in our favor? Or will he strike out at once for the open stretches leading to the vital regions of the country hoping to destroy what forces we may be able to oppose to him by the swift decision of the war of movements and establish himself in a position from which he can dispatch his forces in any desired direction? We do not believe that the choice between these alternatives would be doubtful.

Let us also be a little more subjective as to our own part. Shall we adopt a situation such as might occur on Long Island as the type toward which we should direct our preparations and consider maneuver warfare only as preliminary to the real business of trench fighting? Or shall we consider as our primary problem of defense the protection of the region most vital to our national existence and resolve to ensure that protection by the only real soldierly purpose that can animate a military force—the destruction of any enemy who may seek to destroy us?

We should not fall into the delusion that "trench warfare" follows as a necessary sequel to the initial operations of war. It is not, however, the intention here to attempt to demonstrate that it is an impossible occurrence on American terrain. We are not prepared to make any such rash prediction. But we do feel safe in stating that "trench warfare" on a large scale will not occur until the causes that produce it are present, and these are as yet nowhere in sight in the United States. Doubtless at the conclusion of the present war, the whole defensive system of European powers will be largely if not entirely based upon entrenched positions—because the causes of the present situation, universal service and a restricted theatre of operations, will persist after the end of the present war. This will, however, be no ground for similar action by a nation in which these causes are not present.

It is often said that the aeroplane has eliminated maneuver as a factor in military operations. It is doubtless true that it will no longer be safe to take the chances that could be taken in former wars, of weakening one's forces at a particular point in order to mass them at a point where a decision is sought. But advantage of position will always continue to be a factor of enormous importance in war, and this advantage cannot be gained without maneuver. If fore-knowledge of the various moves that are made could nullify the value of advantage of position, the outcome of a game of chess which depends entirely upon that advantage, would always be a stalemate. The aeroplane simply modifies the conditions of maneuver but in no way affects its value.

Lack of a clearly developed doctrine as to our own military problem is the cause of our persistently objective attitude on all things military. What that problem is, we do not of course pretend to know. But we are sure that whatever it is, it plays small part in the determination of the greater part of the questions involved in our military policy. The objective attitude pervades all our conclusions on every aspect of the military question—tactics, matériel, technique, organization—and results in the substitution of imitation for design. How could it be otherwise with lack of a central controlling theme to which all aspects of military preparations are subordinated? We even go so far on this road that we attribute this objective viewpoint to other armies who have shaped their preparations with more definite purposes in view. For instance it is often said that the German army, taking heed of the lessons of the Russo-Japanese War, foresaw some such conditions as now exist on western front and provided themselves with the matériel required for such a situation. That the German army was not influenced by any such objective considerations but had a clean-cut, definite purpose in mind would appear from statements made in an article in a recent issue of the *Militär-Wochenblatt:*

"To our good fortune, the *fortresses on the eastern frontier of France* had the same influence on our preparations as position warfare. In contrast to other armies, we have *on that account* for many years included high-angle-fire cannon in our field army."

It is plain that the German army did not make provision for howitzers of a caliber from 9 to 16 inches for the reason that "they might come in handy." Does our army need them? We do not know. We are, however, sure that we could form some pretty definite conclusions on this subject if we will first endeavor to discover what our own military problem is and then apply to it the pertinent lessons of the European war. And we ought to be just as clear as to the method by which an attack on any part of our territory should be met as if we were today confronted with that situation.

Book Reviews

Fundamentals of Military Service. By Captain Lincoln C. Andrews, U. S. Cavalry, Philadelphia: J. B. Lippincott Company, 1916. Limp leather, 12mo, 428 pages. Price, $1.50.

This is a very readable small volume containing a great deal of valuable information for both the professional and the citizen soldier. As indicated by its title, it is especially adapted to the use of the latter, since it embraces only the rudiments of things military and condensed information from all of the principal manuals used in our service.

The opening chapter deals with our military policy, or rather the lack of it, and forcibly sets forth facts which should be familiar to every one.

The space devoted to cavalry was evidently filled in by a cavalryman of the "Old School," as he states: "The first weapon of the cavalryman is his horse; and an opportunity to charge home is his chief delight." No comment on this is necessary, as this point is settled in the mind of the professional soldier, though it might mislead the unsuspecting citizen.

No small amount of ingenuity is required on the part of an officer to stimulate the minds of his men to a keen and sustained interest in their work. Yet to arouse their interest and enthusiasm is one of his duties and should be one of his pleasures. No method can be devised which will make the life of the soldier one long, sweet song, but his profession can be made attractive to him. The author's suggestions as to the best means of accomplishing this result, and his remarks on the subject of leadership, could well be taken to heart and inwardly digested by all the officers in our army.

The functions of the various arms are discussed, their matériel, coördination of action, etc.

This book should be of value to the citizen soldier as it gives him a general survey of the military service and its requirements. Should he care to pursue his military studies still farther, he will find numerous references to standard books.

Small Problems for Infantry. By Captain A. W. Bjornstad, 16th Infantry. Fort Leavenworth: Army Service Schools, 1916. Limp Keratol, 191 pages, including Gettysburg 3-inch map. Price, 75 cents.

This volume consists of a series of problems in the handling of the minor units as covering detachments such as points, advance parties, connecting files, pickets, sentry squads, cossack posts, and the various kinds of patrols, including advance guard, reconnoitering, visiting, contact, and combat.

Each problem is divided into a series of situations, taking the reader through a series of natural events in the ordinary work of the detachment under consideration. A short explanation of the functions of the detachment to be handled precedes each problem, and a discussion giving concise reasons for actions forms a part of each solution.

The solutions are expressed in the plainest manner possible and show a common-sense method of treating the various situations as a means of bringing out the proper tactical use of these important minor detachments. Our in-

fantry arm has long needed something of this kind for our noncommissioned officers and privates that they can read and study for self-instruction.

It will be of great value to subalterns and those of lower grades in the National Guard and officers of our Officers' Reserve Corps. It should also have a big field of usefulness among those who have spent a month at Plattsburg and wish to continue some sound tactical reading on infantry work.

Trained Citizen Soldiery. By Major John H. Parker, U. S. Army. Menasha: George Banta Publishing Company, 1916. Cloth, demy 8vo, 206 pages. Price, $1.25.

This book differs from the majority of those on the subject of adequate National Defense, in that it not only states clearly and concisely the existing conditions and needs of our country in this respect, but it gives definite estimates of men and money required for the purpose.

The author rightly assumes that every citizen owes to the country his share of her defense. In case of a life and death struggle, as at Liége and the battle of the Marne, he is expected to render service; but in modern times, when wars come suddenly, he is unable to serve properly without previous preparation. Hence the country has the right to demand that its citizens prepare themselves in time of peace.

This is the only possible solution financially. To maintain a standing army of 500,000 men, an adequate first line, would be too much of a drain on the treasury. In order to get the men, sufficient inducements would have to be offered, and the government would simply be competing with the labor unions.

The plan divides the forces for defense into the "Permanent Personnel" and the "Transient." The former will consist of: (*a*) an Oversea Defense—2 divisions (war strength); (*b*) an expeditionary Force—1 division; (*c*) Training School Element—84 regiments with three regular officers and 25 men per company. The men of the Transient Personnel will be trained for a year then go on furlough for three years, during which they will be subject to call by the President. In this way, we will have 1750 trained men per regiment per year, 540,000 after three years, and, including the militia and the class undergoing training, 250,000 more partially trained men.

The author urges the establishment of an unprejudiced board for testing inventions so that our army can keep abreast of those in Europe. A plan for the defense of the Philippines is also discussed.

The last chapter presents a form of an Act of Congress governing enrollment of citizens for national defense, records, exemptions, methods of expansion, etc.

First Days in Manila. Distributed gratis by the Philippine Branch of the Army Relief Society, Manila. Paper, 8vo, 51 pages.

The purpose of this pamphlet is to furnish information to Army people entering upon a tour of duty in the Philippines. The suggestions it contains will be invaluable to those who are not familiar with present conditions in the Philippine Islands, and who desire information as to what articles of household equipment and personal clothing should

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be procured in the United States before leaving, as well as concerning those which it would be useless to take or which can be procured to better advantage after arrival. It is also a valuable guide-book to the prospective shopper. The impressions which it gives of present-day living conditions of the Army in the Philippines will hold the interest even of those who do contemplate entering upon a tour of Philippine duty. Conditions in the Philippines have changed so greatly in recent years that even those who have already passed a tour of service there will be greatly assisted by the information contained in this pamphlet.

Copies of the pamphlet will be found on all transports en route to the Philippines, and can be secured by addressing request to Mrs. Roger S. Fitch, care Captain R. S. Fitch, Cavalry, A. D. C., Headquarters Central Department, Chicago, Illinois.

THE UNITED STATES INFANTRY ASSOCIATION

"The object of the Association shall be to promote the efficiency of the Infantry arm of the military service of our country by maintaining its best standards and traditions, by fostering esprit de corps, by the dissemination of professional knowledge, and by the exchange of ideas as to the utilization of such knowledge with particular reference to the rôle of Infantry in modern war."—Article III of the Constitution.

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CONDITIONS OF MEMBERSHIP.

All commissioned officers in good standing, or former commissioned officers of honorable record of the regular or volunteer military or naval service and of the National Guard are eligible for regular or associate membership in the Association. Membership dates from the first day of January or July nearest the date of enrollment.

Dues are $1.00 annually, payable in advance. Payment of dues entitles a member to all of the privileges of his class and to all ordinary publications of the Association except the INFANTRY JOURNAL, to which subscription is extra. Members, however, may obtain the JOURNAL for $2.00 the first year, and $1.00 yearly thereafter.

All communications should be addressed to the Secretary, the United States Infantry Association, Room 506, Union Trust Building, Washington, D. C. Cable address: Infantry, Washington.

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The subject will be optional with the writer but must be one of vital interest to the Infantry arm of the service. The importance and timeliness of the subject will be one of the factors considered in making the award.

RULES.

For rules governing the competition, see July-August, 1916, number of the INFANTRY JOURNAL.

Change in Editorship.

Beginning with the next issue, this magazine will be edited by Major Merch B. Stewart, Infantry.

Annual Meeting—Election of Officers.

The Annual Meeting of the Infantry Association will be held at the office in the Union Trust Building at 5 P.M., Saturday, December 16, 1916. The election of officers will be held, and all ballots must be received by that time in order to be counted.

It is considered desirable that a sufficient number of members of the council be selected from among the officers stationed in or near Washington to permit of a quorum being called for the transaction of business. Major Merch B. Stewart, Infantry, has been selected by the Council as editor of the INFANTRY JOURNAL, and past experience has shown that it is desirable to have the editor act as secretary and treasurer, and if elected as a member of the Council, Major Stewart will be appointed to that office.

All regular members of the Association are entitled to vote at the election of officers, and may vote for any individual they desire. Ballot will be found on back of this page.

The following ticket is proposed by members of the Executive Council of the Association stationed in Washington:

President:

Colonel Edwin F. Glenn, 18th Infantry, to succeed himself.

Vice-President:

Lieut.-Colonel Charles S. Farnsworth, Infantry, vice Wright.

Additional Members of the Executive Council:

Lieut.-Colonel Peter C. Harris, Infantry, vice Graves.

Lieut.-Colonel Truman O. Murphy, Infantry, vice Nolan.

Major George H. Estes, 20th Infantry, to succeed himself.

Major Merch B. Stewart, 5th Infantry, vice Lynch.

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Hawkes, Edgar B., 2d Lieutenant, 6th Infantry, Massachusetts National Guard.

Carr, W. W., Lieutenant, 9th U. S. Infantry.

Adams, R. E., 1st Lieutenant, U. S. Marine Corps.

Parker, Paul B., 2d Lieutenant, 17th U. S. Infantry.

Lange, Otto F., 1st Lieutenant, 23d U. S. Infantry.

Spencer, Lorillard, Lieutenant Colonel, 15th Infantry, New York National Guard.

Chambers, Charles C., 1st Lieutenant, 5th Ohio Infantry.